



VOL. XXXII.

CLEVELAND, O., JULY 20, 1905.

No. 3.

ERIE INTERESTED IN SHIP CANAL

A delegation of leading financiers, manufacturers and professional men from Erie visited Pittsburg last week to present the advantages of that city as the lake terminus of the Lake Erie and Ohio river ship canal.

The delegation was a joint committee representing the Erie chamber of commerce and the Erie board of trade. From the chamber of commerce were its president, A. O. Osborne; Robert J. Moorehead, president of the Personal Security & Trust Co., and Frank Wallace, president of the Second National Bank of Erie, and treasurer of the Pittsburg Coal Co. From the board of trade were ex-Judge Frank Gunnison, Attorney H. E. Fish and ex-Mayor William Hardwick, president of the Union Iron Works.

The visitors were the guests of the Lake Erie & Ohio River Ship Canal Co. at luncheon at the Union Club. Afterward a meeting of the directors of the company was held, at which speeches setting forth the advantages of Erie were made by Messrs. Osborne, Hardwick, Gunnison and Fish.

The visitors all declared that the people of Erie were greatly interested in the ship canal and would respond to any calls that might be made upon them in constructing it. They said they were aware that the route through Ohio presented some advantages from an engineering standpoint, but they felt the all-Pennsylvania route, with a terminus at Erie, had great merits which balanced those which appeared in favor of the other.

E. J. Lloyd, Emil Swensson, Thomas P. Roberts, James W. Wardop, John E. Shaw and other directors of the canal company replied to the questions of the visitors and gave them assurance that the route of the canal would not be selected for some months yet, and that the people of Erie should have a full opportunity of showing the advantage to be derived from making that city the lake terminus.

It was pointed out that, no matter whether the canal entered the lake in eastern Ohio or western Pennsylvania, Erie would be greatly benefited by the construction and operation of the waterway. The visitors presented an invitation to the directors and engineers of the canal company to visit Erie in September. The invitation was unanimously accepted.

In conversation the members of the party declared that Erie people felt that the canal ought to be a Pennsylvania institution, and that their city, with its magnificent harbor, offered an ideal terminus. If Erie were selected the most liberal subscriptions would be made to the stock of the company and there would be no difficulty in raising at least \$1,000,000 for that purpose.

JAPANESE FERRY STEAMERS

The Mitsu Bishi Dockyard & Engine Works at Nagasaki will soon deliver to the Sanyo Railway Co. two ferry steamers to run between Fusan, Korea, and Shimonoseki, Japan, in connection with the Sanyo and the Fusan-Seoul-Wiju system of Korea. The distance between the ports is 120 miles, and the steamers are expected to make the voyage in eight hours. The Iki Maru and the Tsushima Maru, as these vessels are to be called, are steel twin-screw steamers of light construction, of about 1,600 tons gross, fitted with good accommodations for twelve first-class passengers, sixteen second-class berth passengers, twenty-nine second-class passengers, without berths, and 238 steerage passengers. They are 260 ft. long, 36 ft. wide, 22 ft. deep, and their draught when fully loaded is 12 ft. 6 in.

Accommodations for passengers are provided in both European and foreign style. The social hall, with two of the first-class staterooms, is at the forward end of the upper of the two decks, while the dining saloon and the remaining four first-class staterooms are directly below on the main deck. The after part of the upper deck is given up to the second-class accommodations, with the steerage below on the after main deck. The after part of the upper deck is given up to the second-class accommodations, with the steerage below on the after main deck. A novelty is the installing of large trough baths, in Japanese style, for the second and third class passengers. Each ship will have a cold-storage chamber with a capacity of about 300 cubic feet, fitted up for the transportation of fish. The lighting throughout will be by electricity, and all the spaces for passengers will be heated by steam.

The starting of these steamers will bring the entire Japanese railroad system in close connection with the Korean system, and through that with the Manchurian and Siberian roads, when the short gap between Wiju and Liaoyang is filled, as it soon will be, so that a traveler may make the journey from Tokyo to London with scarcely twelve hours on the water.

James Rees & Sons Co., Pittsburg, Pa., will build for the Arkansas River Packet Co., a new steamer to be known as the S. S. Brown, in honor of Capt. Samuel Brown, of Pittsburg. The steamer will be 220 ft. long, 44 ft. beam and will have engines of 1,200 H. P.

The ship building plant of the Wm. R. Trigg Co., Richmond, Va., was sold by order of the court last week to Frank Samuel and to H. G. Lloyd, both of Philadelphia, for a total of \$368,000. It is understood that the purchase was made for the bondholders.

LIVERPOOL SHIPPING LETTER

Liverpool, July 10.—The Mersey Docks & Harbor Board has just issued the annual comparative statement, showing the number and tonnage of vessels which have paid rates to the Board, together with the amount of rates and dues received on vessels and goods for the past year ending June 30, and for the preceding twelve months. The first return deals with the number of vessels using the port, and these totalled 26,065 vessels of 15,996,387 tons compared with 25,400 vessels of 15,626,241 in the previous year, an increase of 665 vessels and 370,146 tons. These figures it should be noted, represent the total net register tonnage of vessels paying rates to the Dock Board, inwards and outwards as the case may be. To arrive at the total tonnage which entered and left the Mersey, it is necessary to double the figures, so that the total tonnage inwards and outwards for the past year was therefore 31,992,774 tons. The number of vessels paying dock tonnage rates was as follows: 252 foreign sailers of 262,804 tons, and 1,437 coastwise sailers of 118,210 tons; 4,190 steamers of 10,221,038 tons sailing foreign, and 11,292 steamers of 2,228,433 tons sailing coastwise. These figures represent increases except in the case of the coastwise sailers. Those paying harbor rates only are given as follows: Sailers, foreign, 86 vessels of 48,267 tons; coastwise, 1,282 vessels of 113,232 tons; steam, 1,454 vessels (foreign) of 1,977,561 tons, and 6,071 vessels (coastwise) of 1,026,852 tons. The only decrease in these latter figures is in the number of steamers sailing foreign. The rates and dues received show a substantial increase in the grand total, being \$6,722,800, against \$6,600,625, an increase of \$122,175. Of the grand total of receipts, the sum received for rates on vessels was \$3,551,275, and for rates and dues on goods \$3,171,525. Graving dock and gridiron rates contributed \$180,415, as against \$186,090 in 1904. The amount received on conservancy account, which is also included in the total, was \$338,605, an increase of \$6,750.

The huge scheme of new docks involving an expenditure of \$20,137,500, which I detailed in my last letter, was again considered by the Mersey Docks and Harbor Board at their meeting this week, and was unanimously confirmed. The Dock Board also decided to spend a further sum of \$213,750 on building additional shed accommodation at the new Canada Branch Dock No. 3, now in course of construction. The great amount of capital expenditure now being incurred and projected in new docks and extensions, and also improvements to existing ones, should place Liverpool abreast of all shipping requirements for years to come and very far ahead of its competitors in the United Kingdom and elsewhere.

The monthly return of shipping casualties to vessels of 500 tons gross and upwards prepared by the Liverpool Underwriters' Association, shows that during the month ended June 30, the number of vessels totally lost was 19, of 30,384 tons, compared with 20 vessels of 37,137 tons, in June of last year. These figures include five British sailers of 6,975 tons (compared with one of 1,432 tons in the corresponding period last year), and three British steamers of 6,955 tons (compared with seven of 15,177 tons); five foreign sailers of 6,075 tons (against four of 6,783 tons), and six foreign steamers of 10,379 tons (compared with 8 of 13,745 tons). During June the partial losses were as follows: British, 13 sailers (against 23 in June, 1904) and 142 steamers (against 173); foreign, 29 sailers (against 22) and 118 steamers (compared with 145). The causes of the various casualties were: stranding, 106; collisions, 101; damage to machinery, shafts and propellers, 42; weather damage, 33; fires and explosions, 27; foundering and abandonments, 2; missing, 2, and other casualties, 8. Four vessels, the *St. Kilda*, *Tetartos*, *Ikhona* and *Prinsesse Marie*, were sunk by Russian cruisers, the total estimated value of hull and cargoes being returned at \$1,700,000.

At Messrs. Vickers Son & Maxim's naval construction

Works at Barrow, on July 4, the battleship *Katori*, built for the Japanese government, was launched by Princess Arisugawa of Japan, and her launching weight was 9,400 tons—the heaviest on record. The *Katori*, along with a sister ship building on the Tyne, will be one of the largest vessels afloat, although the *Dreadnought*, building for the British government will be slightly larger. The *Katori* is 420 ft. long, 78 ft. beam, 27 ft. draught, and has a displacement of 15,950 tons. She will have a speed of 18½ knots. The armament of the vessel will consist of four 12-in. guns, twin mounted in barbettes weighing 57 tons each; four 10-in 34-ton guns, placed in single barbettes; twelve 6-in. 8½ ton guns, of 47 calibres, five mounted on each broadside and two on the upper deck, and twelve 12-pounder, three 3-pounder guns, and 84 Maxim guns. This is in fact the most powerful ordnance ever placed in any war vessel. The guns are all of the Vickers type. The great 12-in. guns will throw a projectile of 850 lbs. with a velocity which will enable them to pierce modern armor 9 in. thick at a range of six miles, and armor 13 in. thick at a range of four miles. The 10-in. guns fire a 500-lb. shot which will pierce 6½ in. armor at a range of six miles. A round from the 20 Maxim guns represents a collective energy of 375,000 ft. tons. The *Katori* will be able to discharge in one minute no less than 24,800 lbs. weight of shot, a collective energy of about 1,400,000 ft. tons. The four 12-in. guns may be trained on the broadside, as well as some of the other guns, which means that in one minute a collective energy of 500,000 ft. tons, or 15,800 lbs. weight can be discharged from the broadside. A hot pursuit can be maintained by means of two 12-in and two 10-in. and two 6-in guns, which may be fired ahead, discharging per minute four projectiles of 850 lbs., six of 500 lbs. and 20 of 100 lbs. In addition to these there is a considerable number of Maxim guns for repelling torpedo-boat attacks. There are five submerged tubes for the firing of 18-inch torpedoes. Her coal capacity is very large, to enable her to take a long cruise without the necessity of recoaling.

It is stated on good authority here that the Canadian government and the Allan Line are in communication over a proposal to make the experiment of delivering the mails at Sydney, Cape Breton. The idea is to meet the steamer outside the harbor, and after transference of the mails to the waiting tender, the liner will proceed up the Gulf of St. Lawrence to Quebec and Montreal. The arrangement now is to proceed direct from Moville to Rimouski, where the mails are taken and distributed from that centre. Should the negotiations result in the arrangement proposed it will mean a saving of some considerable time, as, in all probability the mails would be delivered at Sydney a day earlier than at Rimouski, and possibly enable them to be delivered in very many districts, including Montreal, before the letters could have been landed at Rimouski. Not only would this advantage be gained in connection with the Canadian mail service, but it is possible, if not probable, that in addition to the Montreal, the Chicago mail, conveyed by the fast steamers now running in the Allan Line would be delivered earlier than the Wednesday's mail service to New York, unless a remarkably fast boat were employed on that route. If the loss of seven hours at Moville under existing conditions could be obviated by putting the letters on board the steamers in the Mersey up to 6 or 7 p. m. of the day of sailing, the acceleration under the suggested scheme would be still more striking. It is needless to point out the advantage in time of the delivery of the mails for the Cape Breton, Nova Scotia, Newfoundland and Canadian mails generally, as well as some of the nearer states of America. To call at Sydney, C. B. would necessitate the abandonment of the Straits of Belle Isle route, which is the shorter, by the Allan mail steamers, but this would be compensated for by the escape from the

fogs which so frequently obstruct that channel, and thus minimize the risk and delay caused by thick weather.

The new steamer *Chr. Knudsen*, which has been built by Sir Roylton Dixon & Co., Ltd. of Middlesborough, on the Harroway & Dixon's latest patent of transverse cantilever framing, has after undergoing a successful trial trip, proceeded to Sydney, Cape Breton. She is under charter to the Dominion Coal Co. Ltd. of Canada, to be employed seven months in the year in their trade between Sydney, N. S. and Montreal, where the most complete appliances in the way of coaling staithes will load or discharge her cargo by means of grabs at the rate of 1,000 tons per hour. The *Chr. Knudsen* is really a remarkable vessel on account of her ravel features. In the first place, she is a perfect self trimmer, requiring no hand trimming at all, her holds being entirely unobstructed by any beams, pillars, or even web frames, which advantage is arrived at by her great fore and aft structural strength through the cantilever frames supporting the water ballast tanks at the top sides underdeck in the wings, which constitute powerful box girders, and consequently do not require any pillaring whatever. Another important advantage of this type is that the space enclosed in the topside water ballast tanks is not measured by the Board of Trade for tonnage register and the Suez canal authorities have also conceded that the space shall not be measured for tonnage in the Suez canal certificate. These topside tanks, along with double bottom and peak, contain over 2,000 tons, giving full immersion of the propeller when in ballast trim. She can carry about 7,000 tons on a draught of 22 ft. 7 in. Such a vessel with her long, clear holds, has certainly manifest advantages for special kinds of cargo, such as iron ore, coal, grain, deals or logs, and frozen meat.

It is rumored, but not yet officially confirmed, that Sir W. G. Armstrong, Whitworth & Co. are likely to acquire the Orlando ship yards at Leghorn, which, together with the well-known Pozzoli works at Naples, now controlled by the Armstrong Co., would give the firm a very large interest indeed in Italian government shipbuilding.

The report that has been published in the London press that the Cunard Co. have decided to run their two new transatlantic steamers from Dover instead of from Liverpool, is, it is understood, entirely unfounded. The Cunard Co. officially deny that there is any truth in the report.

The Scottish shipbuilding returns for the half year just closed supply a new record of work accomplished, which exceeds that of 1902, the previous best. The total for the half year is 160 vessels of 259,800 tons, which surpasses by 58,227 tons, the figures of the corresponding period of 1904, and shows an increase of 56 tons over the previous half year's record. It is not likely, however, notwithstanding the exceptionally good start, that the latter six months of the year 1905 will show such satisfactory results, and though the year's work ought to, and no doubt will, be an improvement upon the average of previous years, it is not likely that it will constitute a record. In districts the Clyde contributes 234,736 tons, Tay 14,096 tons, Forth 8,858 tons, and Dee 2,170 tons.

NEW DOCK AT MANCHESTER

A new dock, 2,700 x 250 ft. was opened last week at Manchester, England, by King Edward VII. and Queen Alexandra. The chief engineer of the Manchester Ship Canal Co., which built the dock, is Mr. W. H. Hunter. He was recently appointed by President Roosevelt as consulting engineer for the Panama Canal. The new dock is situated on part of the old race course. The water area is 15.5 acres. With the surrounding quay space, railways, etc., it covers 32.6 acres. Transit warehouses on the south side of the dock are composed of four buildings, each 425 ft. long and 129 ft. in width. The total area of these new buildings is 105,000 sq. yds. The

buildings are constructed of ferro concrete on the Hennibique system. The whole structure is formed of steel rods embedded in Portland cement concrete. The north side of the dock is laid out for open storage of cargoes, paved quays, roads, etc. The south side of the dock, an area of 67,000 yards has been given up to railway sidings, of which there are nine miles. At the easterly end of the dock a grain elevator is under construction, with a capacity of two million bushels.

In addition to the new dock there are already eight docks in use in the port of Manchester at which ocean steamers berth, the dimensions of the largest being 1,340 feet by 250 feet. The equipment on these docks includes 50 hydraulic, 58 steam and 26 electric cranes, in addition to which there is the 30-ton crane in use. The new dock is equipped with cranes of every description and of the most modern pattern.

The traffic of the canal during its first year of business (1894) was 925,659 tons merchandise; revenue, £97,901. Last year (1904) tonnage in traffic amounted to 3,917,578; revenue was £418,043.

Entrance to the ship canal is situated nineteen miles from the mouth of the River Mersey. The canal is 35½ miles long, the whole length of it being intersected with docks, but the principal ones being situated at Manchester, which is 50 miles from the sea. The depth of the canal is 28 ft. and the minimum bottom width is 120 ft. A variety of large manufacturing concerns are situated along its banks, while in Manchester are the immense oil tanks of the principal American and foreign companies.

YACHT BOUGHT FOR SCIENTIFIC PURPOSES

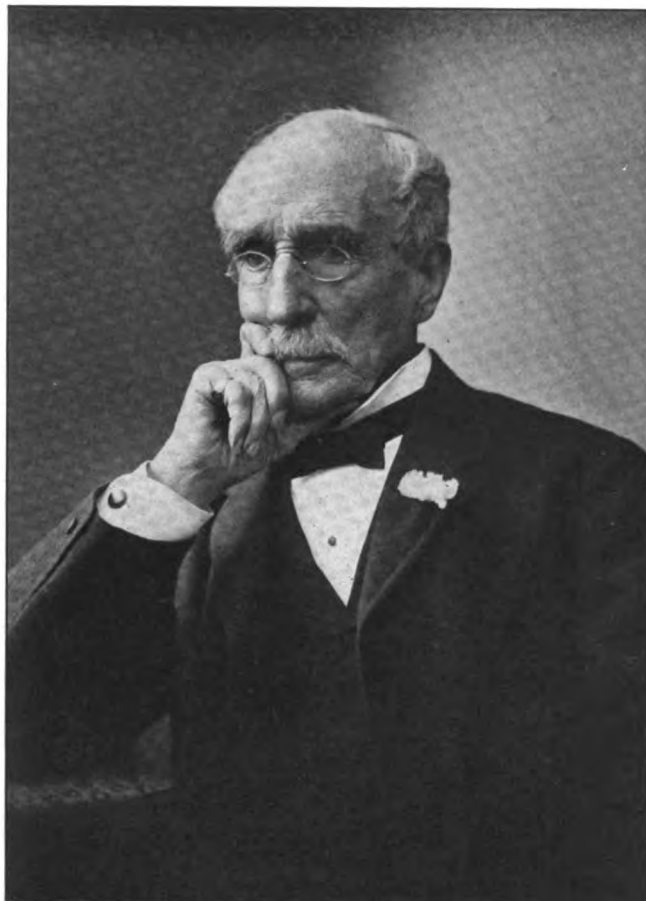
The trustees of the California Academy of Sciences recently bought from the United States navy department the schooner yacht *Earnest*, of about 127 tons, which was used for surveying the waters of Alaska and the Hawaiian Islands. She has been renamed *Academy*. On June 23 Miss Dickie, daughter of George W. Dickie (of the Union Iron Works and one of the trustees of the Academy), recited a poem written for the occasion by her brother. Among those present were: E. J. Molera, president; L. H. Foote, secretary-treasurer; George W. Dickie, W. H. Crocker, U. S. Senator Perkins, and L. M. Loomis, trustee of the Academy of Sciences; also C. Hart Merriam, chief of the biological survey of the department of agriculture. Next day the Academy sailed for the Galapagos Islands, with a party of scientists, who will make extensive collections of the plants, mammals, insects and reptiles found there. They will devote special pains to securing specimens of the giant tortoises from which the islands derive their name. These huge creatures, some of them weighing more than a thousand pounds and of almost incredible age, seem likely to become extinct, so numerous and persistent are their enemies.

The captain of the vessel is J. J. Parker, with F. Nelson as mate and E. Elwell as deck hand. The yacht not being large enough to accommodate a professional crew as well as the scientific staff, all will help in handling her. The chief of the expedition is R. H. Beck, who has paid three previous visits to the group and has been on every one of the islands. He will make observations on the birds and mammals. E. U. Gifford will study the habits and distribution of the birds, in which work J. S. Hunter will assist. J. R. Slevin, curator of the department of herpetology of the Academy, and E. King will observe and collect the reptiles. W. H. Ochsner will study the geology, paleontology and conchology and F. K. Williams will gather the beetles and other insects. The vessel is expected to be in San Francisco harbor again about Christmas, 1907.

The ferry steamer *Ludlow* was launched last week from Hilliard's ship yard, St. John, N. B.

CHARLES H. HASWELL

The announcement at the June meeting of the American Society of Mechanical Engineers that Charles H. Haswell had been elected an honorary member of the society was received with hearty applause. He forms a link between Fulton and Melville and possesses a robust personality that indicates excellent prospects for his complete enjoyment of the Fulton



MR. CHARLES H. HASWELL.

centennial celebration in the near future. He is a resident of New York, where he was born ninety-six years ago. He received an academic training and at nineteen was employed in the engine shop of James P. Allaire of New York. In 1836 he entered the United States Navy as chief engineer and was commissioned Engineer-in-Chief in 1843. During his naval service he designed and built the first steam launch, the *Sweetheart*, in 1837, and also designed the machinery for ten war ships. He retired from the navy in 1851 and then built several merchant steamers and designed and built various important engineering structures. He was the first to apply zinc in a steam boiler, in 1847, and later used it in the hold of a vessel to arrest the corrosive action of salt water. This was long before its trial elsewhere as a new invention. Mr. Haswell had acquired a national reputation by this time and in 1853 by way of acknowledgement of some professional service he received a diamond ring from the Emperor Nicholas of Russia.

When the Engineer Corps of the Navy was organized by Congress, a man from civil life was appointed to the position of Engineer-in-Chief. The *Missouri* was soon after ordered home for the purpose of testing a novel design of horizontal smokestack. Mr. Haswell found it impossible to endorse the scheme as practicable and being further of the opinion that two pipes of $3\frac{1}{2}$ ft. in diameter were not of the same capacity as one pipe of 7 ft., he was held to be guilty of disrespect to his superior officer and was suspended from duty. Further investigation demonstrated the accuracy of Mr. Haswell's con-

tention and he was informed that if he would apologize for his "insubordination" he would be restored to duty. This by no means met his views and he replied, "I prefer to submit to injustice from others rather than do it to myself. I decline to give an apology as I owe none." He was detached accordingly from the *Missouri* and set to work on the design and construction of four revenue cutters and then a steam sloop at Pittsburg. The Engineer-in-Chief was soon officially ignored and Mr. Haswell discharged his duties and in 1845 was promoted. He held the position to 1851 when President Fillmore supplanted him with a civilian, but restored to him his rank as Senior-Chief-Engineer.

The well known *Powhattan* was one of four steam frigates designed in 1848 by a board of which Mr. Haswell was a member. He designed the entire engine and boiler equipment of the *Powhattan*. This task is the more remarkable owing to the great difficulties under which the work was satisfactorily accomplished. He lacked professional and cleri-

324 WEST 78TH STREET
NEW YORK

June 20/04
Dear Sir
Herewith I
forward a response to
your kind letter of the
15th inst.
Respectfully
Chas H. Haswell

R I Copy Eng

FULL SIZE FACSIMILE OF THE VETERAN'S WRITING.

cal aid, was under urgent pressure from the naval authorities and the contractors and he proceeded without a general design to perfect and carry out the design in detail. He made the working drawings with his own hands in the intervals between periods requiring attention to the duties of his office as Engineer-in-Chief of the Navy. The attempt was unprecedented in so important an enterprise and to carry it into a perfected form indicates the engineering aptitude and skill brought to bear on the problem.

Mr. Haswell was ordered to the Mediterranean in 1850 though in indifferent health and despite the condemnation of a board of surgeons. He proceeded to the Mediterranean but

soon returned home as "unfit for active service from ill health."

From 1851 to 1893 he held the position of surveyor of steamers for the marine underwriters of New York, Boston and Philadelphia. He designed and located the structures on Hoffman Island in New York harbor, the crib bulkhead at Hart's Island, the foundation of several of the large buildings in New York. He has supervised testing of the water works capacity at New Bedford and Chicago. He is at the present time consulting engineer for the Board of Public Improvements of New York. In this capacity he directed the extensive improvements at Riker's Island.

He is the author of a well known pocket book for engineers, a work which has passed through many editions since 1846. He is the author of a text book on mensuration, one on book-keeping and a volume entitled "Reminiscences of an Octogenarian of New York City, 1816 to 1860."

A full size facsimile of his handwriting is here reproduced. It was sent with notes from which this biographical sketch has been prepared. The neat handwriting on the one side of the page and the trim alert figure on the other must be disconcerting to any believer in Oslerism. The good wishes of the engineering fraternity will be cordially proffered to this sturdy American who at 96 years young is the latest recruit to the list of honorary members of the American Society of Mechanical Engineers.

WATCHING THE HOPPER-BOTTOM STEAMERS

Buffalo, July 18.—I hear as a rule nothing but praise of the great steel steamers on the lakes, unless it be the same thing modified by self interest, and then the comment is apparently very different in character, as it comes in the form of envy and complaining that the strides in the business have thrust so many things aside that were good enough for anyone a dozen years ago. Still there is now and then a note of dissent from people who are concerned merely from the expert side of the question. It may happen that nothing comes of the criticism of the work of the shipyards in recent years and then it may be that some heed should be paid to it, lest it come about that the industry be brought up with a rude shock, something as it was now and then in the early days of the steel hull.

I asked an expert the other day if he was entirely satisfied with the building of the largest-sized craft and he admitted that he was not, though he did not go far enough to make any very serious predictions. He said that as the steel hulls grew larger they failed in the fortification they needed. After a certain size is reached there should be very much more inside strength provided, but with a single exception this was not the case. It was true that there was now an inside as well as an outside hull, which was comparatively new, the inside shell coming up at least as far as the main deck, but with this added strength the new construction about stopped.

There is no pretence that the new hull is as flimsy as the whaleback used to be, depending chiefly on its round form to keep it in shape, but special attention was called to the water tanks which in some of the later constructions were 72 ft. long and not fortified at all at the forward end, but open away up forward. It would be so easy to strengthen the hull at the point where the water bottom turns upward that it is reckoned not only an oversight, but a defect of no ordinary consequence. When it is reflected that the largest steamers are open for carrying about 1,000 tons of water ballast it is seen that there must be a very large opening there and one which the expert looks on as sure to make a hole in the reserve of the insurance companies if a good-sized hole should be made in the boat's bottom at the right place. So why not extend the tank top right on forward as far as it will

go and make the most of the chance offered for providing needed strength? Some time it may be needed.

If, as some experts are saying, the new and daring lengths of lake vessels are enabling them always to extend to at least two wave crests at a time, while the shorter vessels are being weighted down almost to breaking by a single wave that must at some moment be exactly under their middle, it may happen that the supreme storm test to which the older craft is subjected has been escaped in the new construction, yet this is not saying that lateral pressure is provided for in this way.

The expert is watching the hopper-bottomed steamers. They may not always be fortified in all directions as the regular hulls are not, but they certainly must be stronger in some regards. "Wait for the Hoover & Mason," was the injunction. "I am looking for a hull there with an immense strength transversely. She ought to stand any amount of twisting. Whether she proves just as strong in other regards will depend on her other construction, but that much seems to be provided for to a certainty."

It seems a little odd that any possible defect in construction that was put out to be rectified by a new inside construction that was put in on account of accommodating and handling cargo entirely, but it may turn out to be so. Accident has many times been turned to account in such ways and it is possible now. Our expert does not appear to put any particular value on the hopper-bottomed hull as a mere carrier. The ordinary bottom carries "the goods" all right. If there is anything forthcoming that will add something to the strength of the new steel hull in a general way let it come, but even then it can probably be provided quite as well with view to that alone as to carrying and handling capacity.

No fault is found with the lengthened steel steamers. The work appears to have been done well and the problem is an easy one. So far as can be learned they all behave well, so all that has to be considered is whether the cost of the work is coming back in the work done by the enlarged boat. As a rule it seems to be a satisfactory proceeding in that respect also, though figures usually show that the percentage of earning to cost of the enlarged craft is not very different from what it was at first. Fuel and wages do not increase very much, but it costs a lot of money to cut a steamer in two and get her ready for the new work.

JOHN CHAMBERLIN.

STEAM SHOVEL RECORD

The record for handling ore with a steam shovel has been broken by a ninety-ton machine at the Hull mine in Minnesota. In 5 hours, 36 minutes this shovel loaded from a stock pile 138 thirty-ton cars of ore, or a total of 4,140 tons. At the Cincinnati, Hamilton & Dayton docks in Toledo, O., on June 17, 10,000 tons of coal were transferred from the cars to the steamer Ball Brothers by a McMyler machine in 14 hours flat. A total of 250 car loads were handled, and the quickest time was made in transferring thirty-eight car loads brought in as a special to fill out the cargo. These cars arrived at the dock at 3:30 p. m., the transfer to the boat was completed at 4:55, and five minutes later the boat cleared and was heading for Lake Erie en route to Duluth. The steamer Ball Brothers has twenty-eight hatches.

Chairman Shonts of the Panama Canal Commission, Chief Engineer Stevens and Col. O. H. Ernst of the engineering committee will sail for the isthmus this week on the steamer Mexico, which has just been purchased by the commission. Mr. Stevens expects to remain on the isthmus for several months. It is expected that much will be accomplished during their stay towards clearing up the preliminary work under Mr. Stevens and placing at his disposal the proper facilities for the actual digging of the canal.



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JULY 20, 1905.

There is not much time left in which to do it. If the semi-centennial celebration of the opening of the first canal at Sault Ste. Marie is to be worthy of the event things had better be moving. It is time that some definite announcement of the program should be made. It should be a program that has commercial significance. A series of games which it is understood is to be a part of the event is all very well, but the canal was not built for games. The exercises should be as dignified as the act which they commemorate. The celebration should be of such a character as to impress the country with the authoritative position that the canal holds in the industrial life of the nation. It should be of such a character as to compel congress to look more leniently upon appropriations for the improvement of this great waterway. Already the locks are inadequate to care for the commerce that is crowding them. While the latest lock was made to lock through four vessels at one time it can only lock one of them; and already a ship is on the stocks that will be unable to go through the great Canadian lock at all. This is the Wm. G. Mather, whose beam is the width of the Canadian lock—60 ft. Every effort should be

made to get the members of the committee on rivers and harbors of the house of representatives and of the senate committee on commerce at Sault Ste. Marie to participate in the celebration. It would be a fine thing if the president himself could attend, though there is probably little hope of this. What is wanted is an impressive celebration from a commercial standpoint. Enough money has probably been publicly appropriated and privately contributed to make the celebration a great one if intelligently directed. Assuredly the vessel interests are eager to make great maritime display at that great artificial waterway which has meant so much to them. The coming celebration is due to the untiring efforts of the Hon. Peter White of Marquette and his word in its direction should be law.

The Lake Superior region, which this canal opened to commerce, is a great and wonderful country. It is full of romance and story. In a mineral sense there is nothing like it on the globe. Without the Lake Superior region indeed the United States could not hope to be an industrial nation. It would still be importing pig iron from Britain. As it is, it is the greatest iron and steel producing country in the world, a circumstance which has contributed more than any one thing to the wideness with which wealth and country is distributed among its people. The canal at Sault Ste. Marie belongs neither to a section nor a state. It belongs to the country for every American citizen has, as an individual, profited through its existence. Therefore the celebration should be national and dignified.

If Napoleon Bonaparte were alive today he probably would fight pull and graft with all of his energetic soul. Napoleon had the habit of dealing with things quite frankly and his grand-nephew, Charles J. Bonaparte, the new secretary of the navy, seems to be of the same sort. He certainly believes in square dealing and is indifferent to political influences. He transacts business in a very sensible and common-sense way. For instance, he has just reinstated Civil Engineers J. W. G. Walker and F. R. Harris, of the Charleston navy yard in the posts from which they were some time ago removed at the request of contractors, who had complained against the rigor of their inspection. Giving his reason for his action Secretary Bonaparte says:

"The engineers Walker and Harris have been vigilant and conscientious in discharge of their duties and have held the contractor up to the specifications. This contractor thus repeatedly requested that these supervisors of its work be replaced by others, and the department finally complied with his request. Whatever might have been the merits of such action, if taken spontaneously or under other circumstances, I am compelled to look upon it as unfortunate when thus induced and under the circumstances actually existing. In my opinion its moral effect would be probably undesirable

for contractors for government work and supervising officers, and, on the whole, unsatisfactory both within and without the service."

No citizen can quarrel with the position that Secretary Bonaparte has taken in this case. To remove these men for the cause assigned would certainly tend to demoralize inspection officers.

HEAVY ORE MOVEMENT

There has never been a season like the present one for the movement of ore, and the July record will probably be the heaviest of all. It is expected now that 5,300,000 tons of ore will come down the lakes this month. The ore is bearing the brunt of the bulk freight trade, getting very little assistance indeed from coal, so that vessels at upper lake ports in order to get cargoes have to be shifted a great deal. Neither is normal dispatch had at Lake Erie ports though it is noted that an unusual proportion of ore is going directly into cars. In point of fact, the movement of ore is practically an unbroken stream. The trains from the mine follow each other at half hour intervals and unload their cargoes into the great ore docks, which notwithstanding their enormous pockets, have limited storage capacity in proportion to output of mines. The ore shoots through the pockets into the hold of the vessels almost as soon as it is received to be unloaded directly into cars at Lake Erie ports which are moved at once to the furnaces. The furnace yard comes by this process the only storage plant for ore.

A new unloading record was made at Conneaut this week, when the steamer George W. Perkins unloaded a cargo of 10,514 tons of ore in four hours and ten minutes, actual working time. Four Hulett clam-shells and four Brown electrical machines were working upon her, but the detailed figures as to the performance of each machine are not at present available. This record is, however, safely better than the record established last July by the Augustus B. Wolvin, when 9,945 tons of ore were taken out of the Wolvin by this same equipment in four hours and six minutes actual working time. All of the Perkins' ore was placed upon cars, while half of that taken out of the Wolvin last year was put on dock. Moreover, fifty men worked in the hold of the Wolvin cleaning up, against thirty-two in the Perkins.

The steamer Gary, sister ship of the Perkins, in seven trips from May 30 to July 19 has moved 74,617 tons of ore. Her largest cargo, carried from Ashland to South Chicago, was 10,877 tons, on her last trip. She had carried on one of the trips 11,883 tons from Escanaba to South Chicago, but was, of course, favored with draught on this latter route.

CHICAGO GRAIN REPORT

Chicago, July 19.—Grain freights note a very fair movement from last report but shipping inquiry is indifferent. Carriers were slightly in excess of offerings on a basis 1½c corn for Lake Erie and Georgian Bay routing. The attractive offering at Montreal carries at 3½c corn, for the time being is meeting with slow responses.

The past week's shipping distributed as follows: Via all rail lines, of wheat, 90,000 bu.; corn, 291,000 bu.; oats, 780,000 bu.; via lake steamers to Buffalo and other American points, of wheat, 55,000 bu.; corn, 1,320,000 bu.; oats, 110,000 bu.; and to Canada points via lake, of corn, 523,000 bu., and oats, 344,000 bu. Lake and rail shipping follow in the usual order.

Lake and rail shipments:

	This week.	Last week.	Same week last year.
Wheat	151,983	104,677	147,200
Corn	2,142,083	2,279,654	1,878,008
Oats	1,233,100	619,464	980,215
Rye	3,278	2,200	750
Barley	16,833	19,142	12,910
	3,547,373	3,028,077	3,019,173

Lake and rail shipments since Jan. 1, 1905:

		Same time last year.
Wheat	6,819,716	7,121,584
Corn	48,875,871	33,914,892
Oats	27,150,252	25,339,165
Rye	599,199	789,960
Barley	2,341,112	2,644,138
	85,792,141	69,809,739

Stocks of grain in private and public elevators:

	This week.	Last week.	Same week last year.
Wheat	900,000	1,093,000	2,144,000
Corn	5,856,000	5,403,000	5,534,000
Oats	3,145,000	3,224,000	730,000
Rye	76,000	79,000	454,000
Barley	10,714	10,714	184,000
	10,056,714	9,809,714	9,052,000

CAPT. MARTIN DEFENDS THE JUNIATA

Capt. Martin, master of the Anchor Line's new steamer Juniata, which was in Duluth port the other day, declares that his craft still carries the broom. He denies the Juniata came out second best in a test of speed with the crack Canadian flyer Huronic.

"We beat the Huronic at least four miles the last trip up," said Capt. Martin in an interview when asked about the recent race between his boat and the Northern Navigation liner. "When the Juniata picked up her course at Fort Gratiot on the upbound trip July 1, we were 35 minutes behind the Huronic, and when we turned at Presque Isle, on our way to Mackinac, the Huronic was four miles astern. The Huronic may not have been racing, but she picked up more coal at the Soo, which is a pretty good indication that there was something doing out of the ordinary. The statement that the Huronic beat the Tionesta, sister ship of the Juniata, last year, is not founded on fact. I was master of the Tionesta last season, and I ought to know something about it. On the night the Huronic is said to have beaten the Tionesta, we left Marquette at our regular time, bound down, and on our course picked up and overhauled the Huronic. I was in quarters at the time and did not know anything about the occurrence until we got in near Persian island, when the thick weather compelled us to slow down. There were a number of boats ahead, and we finally checked down altogether and lay for a long time, waiting for the fog to lift. It was thick ahead, but we could distinguish objects astern. When I asked the mate what boat was coming behind us, he replied it was the Huronic, also saying she had followed us since leaving Marquette. When the fog lifted the Huronic was about half a mile ahead of us, and we were both locked through at the same time. The next time the incident was brought to my attention was when I was shown a clipping from one of the Sarnia newspapers, telling how the Huronic had beaten the Tionesta. The Huronic people are entitled to all the credit they care to take out of either race. They have never yet seen the bow of either the Tionesta or the Juniata. Their view has always been from the stern."

Mr. George H. Gibson has been succeeded by Mr. F. L. Sayer, 114 Liberty street, New York, as head of the department of publicity of the International Steam Pump Co.

REGISTRY OF CANADIAN VESSELS

According to the Railway & Shipping World, the total number of vessels remaining on the registry books of the Dominion on Dec. 31, 1904, including old and new vessels, sailing vessels, steamers and barges, was 7,152, measuring 672,838 tons register tonnage, an increase of 132 vessels, and a decrease of 10,309 tons register, as compared with 1903. The number of steamers on the registry books on the same date was 2,543 with a gross tonnage of 353,514 tons. Assuming the average value to be \$30 a ton, the value of the registered tonnage of Canada on Dec. 31, 1904, was \$20,185,140, against \$20,494,410 on same date 1903. Following is a summary showing the number of vessels and their tonnage by provinces:

	Sailing Ships and Steamers.	Steamers.	Gross Tonnage of Steamers.	Net Tonnage of Sailing Ships and Steamers.
New Brunswick.....	933	138	12,433	54,855
Nova Scotia.....	2,006	193	22,038	211,972
Quebec	1,287	384	87,533	130,339
Ontario	1,886	1,288	151,338	176,430
P. E. Island.....	161	16	2,908	12,200
British Columbia.....	666	414	60,701	77,105
Manitoba	141	99	7,359	7,765
Yukon Dist.....	12	11	3,204	2,172
Grand total.....	7,152	2,543	353,514	672,838
Total for 1903.....	7,020	2,410	338,251	683,147

There are seventy-eight ports of registry in the Dominion, an increase of one in the year, the new port being Sorel, Que. The ports are distributed as follows: Ontario, 38; Nova Scotia, 21; New Brunswick, 7; Quebec, 6; British Columbia, 3; Prince Edward Island and Yukon, one each.

The ports having more than 300 vessels registered are: Quebec, 634; Montreal, 599; Halifax, 426; Ottawa, 407; St. John, 361; Chatham, N. B., 355; Toronto, 350; Lunenburg, N. S., 318. Of steamers there are registered 271 at Toronto; 227 at Montreal; 225 at Ottawa; 184 at Vancouver, B. C.; 154 at Quebec; 136 at Victoria, B. C.; 109 at Kingston, Ont., and 99 at Winnipeg. The port having the largest tonnage is Montreal, with 97,689 tons; Victoria being second with 47,198 tons, and Windsor, N. S., third, with 46,432 tons.

The number of new vessels built and registered in the Dominion during the year was 308, measuring 18,554 tons register tonnage. Estimating the value of the new tonnage at \$45 a ton, it gives a total value of \$834,930 for new vessels, against \$1,364,535 for new vessels built in 1903. The new vessels were built and registered as follows:

	Vessels.	Tons.
New Brunswick.....	25	1,306
Nova Scotia.....	99	5,993
Quebec	20	3,203
Ontario	165	5,167
Prince Edward Island.....	2	185
British Columbia.....	48	2,302
Manitoba	9	338
Yukon District.....	Nil.	Nil.
Total	308	18,554
Total for 1903.....	328	30,323

During the year the names of twenty-four vessels were changed at thirteen ports.

In point of ownership of net tonnage Canada stands eighth among the nations, those having over 100,000 tons being as follows:

British, including Canada and other Colonies.....	11,225,421
United States.....	2,636,281
German	2,298,902
Norwegian	1,300,062
French	1,143,001
Italian	982,118

Russian	924,772
Canadian	672,838
Swedish	639,422
Japanese	587,908
Spanish	541,037
Dutch	469,826
Danish	439,356
Grecian	385,215
Austrian	365,360
Turkish	238,419
Brazilian	162,731
Belgian	164,018

IMPORTANT TEST OF CURTIS STEAM TURBINE

The accompanying report gives the result of a test recently made by Mr. Frederick Sargent and Louis A. Ferguson of a 2,000 K. W. steam turbine generating unit of the Curtis type manufactured by the General Electric Co., Schenectady, N. Y. The turbine is a four-stage machine designed in 1903 and recently changed in a few particulars as a result of experiments conducted during the past year. The machine as tested conforms as nearly as possible to the standard four-stage machines now being produced, but is less efficient since the changes made have been confined to the buckets, while several other important changes, which are now known to be desirable, could not be made in this case without entirely rebuilding the machine. The results here reported have been determined by the most accurate methods and have been verified by repeated tests in addition to those conducted by Messrs. Sargent and Ferguson, duly considering the steam pressure, vacuum and superheat. The report is as follows:

We beg to submit herewith the report of tests made on a two thousand K. W. Curtis turbine, made at Schenectady, under our supervision, May 3d, 1905, as follows: We sent our assistants, Messrs. Clark & Eastman, to Schenectady to prepare the apparatus for making these tests and they made several preliminary trials before our arrival and the results of each of the trials very closely approximated the results of the official tests herein mentioned. We had all the instruments carefully tested and standardized during the trials; the electrical instruments being tested by the New York testing laboratory in the presence of Mr. Eastman. The surface condenser showed practically no leakage. We took every precaution to satisfy ourselves that the tests were reliable and accurate, and we beg to certify that the results obtained were as follows:

FULL LOAD TEST.

Duration of test.....	1.25 hour
Steam Pressure (Gauge).....	166.3 lbs.
Back Pressure (absolute).....	1.49 in. of mercury
Superheat	207. deg. F.
Load in Kilo-Watts.....	2023.7
Steam Consumption per K. W. hour..	15.02 lbs.

HALF LOAD TEST.

Duration of test.....	0.916 hour
Steam Pressure (Gauge).....	170.2 lbs.
Back Pressure (absolute).....	1.40 in. of mercury
Superheat	120. deg. F.
Load in Kilo-Watts	1000.7
Steam Consumption per K. W. hour	16.31 lbs.

QUARTER LOAD TEST.

Duration of test.....	1. hour
Steam Pressure (Gauge).....	155.5 lbs.
Back Pressure (absolute).....	1.45 in. of mercury
Superheat	264. deg. F.
Load in Kilo-Watts.....	555.
Steam Consumption per K. W. hour.	18.09 lbs.

ZERO LOAD.

Duration of test.....	1.33 hour
Steam Pressure	154.5 lbs.
Back Pressure (absolute).....	1.85 in. of mercury
Superheat	150. deg. F.
Steam Consumption per hour.....	1510.5 lbs.

PANAMA CANAL ENGINEERS TO CONSULT

President Roosevelt has issued a call for a meeting of the board of consulting engineers of the Isthmian Canal Commission, to begin at Washington, D. C., on Sept. 1. The text of the order is as follows: "It is hereby ordered that a board of consulting engineers, consisting of Gen. George W. Davis, Alfred Noble, William Barclay Parsons, William H. Burr, Gen. Henry L. Abbott, Francis P. Stearns, Joseph Ripley, Isham Randolph, Herman Schussler, Henry Hunter, nominated by the British government; Herr Eugene Tinecauser, by the German government; M. Guerard, by the French government; M. Quellenec, consulting engineer of the Suez Canal, and one to be designated by the government of the Netherlands, shall convene in the city of Washington at the rooms of the Isthmian Canal Commission on the 1st day of September, 1905, for the purpose of considering the various plans proposed to and by the Isthmian Canal Commission for the construction of a canal across the Isthmus of Panama, between Cristobal and LaBoca, and that the deliberations of the board of consulting engineers shall continue as long as they may deem it necessary and wise before they make their report to the commission. The Isthmian Canal Commission is directed to have all the proposed plans in such detailed form, with maps, surveys and other documents sufficient to enable the consulting engineers to consider and decide the questions presented to them. Should it be deemed necessary by the members of the consulting board they may visit the Isthmus before making their final report. If there is a difference of opinion between the members of the consulting board, minority reports are requested. Gen. George W. Davis is hereby designated as chairman of the board of consulting engineers. Instructions more detailed will be given in time, to be presented to the board when it first convenes on Sept. 1. The chairman is directed to communicate the contents of this order to the different members with such details as may be necessary."

GROWTH OF SUEZ CANAL TONNAGE

The following figures (taken from *L'Echo de l'Industrie*, and originally from the *Bulletin* of the Office of Universal Statistics at Antwerp) give the main facts regarding the growth and use of the Suez canal. We give the statistics by five-year periods up to 1900:

Year.	Number of Ships.	Tonnage of Ships.
1870	486	463,600
1875	1,494	2,009,984
1880	2,026	3,057,421
1885	3,624	6,335,752
1890	3,389	6,800,094
1895	3,434	8,448,383
1900	3,441	9,138,152
1901	3,699	10,823,840
1902	3,708	11,248,413
1903	3,761	11,906,288
1904	4,237	13,401,835

The distribution of the ships and tonnage for the last year (1904) is as follows, in percentages:

	Ships.	Tonnage.
English	74.0	76.06
German	13.8	10.50
French, Dutch, Norwegian, Austrian, Italian..	10.5	8.70
Other nations.....	1.7	4.74
Total	100.0	100.00

It may be interesting to add, by way of comparison, that the business of the Sault Ste. Marie canal, connecting Lake Superior with Lake Huron, in 1904, showed the passage of 16,120 vessels, having a total registered tonnage of 24,364,138 tons, and carrying 31,546,106 tons of freight. The Sault canal, moreover, is closed for five months of the year, while Suez is always open.

BATTLESHIP EQUIPPED WITH TURBINES

It is understood that the British admiralty has placed orders for the construction of the machinery of the new battleship now being built at the Portsmouth docks and with Vickers Sons & Maxim, Ltd., and special interest attaches to the contract because the vessel is to be fitted with Parsons steam-turbine machinery, which has not hitherto been adopted for any warships other than torpedo craft and light third-class cruisers. The work, too, is to be executed in record time, as it is hoped that the vessel will be on trial before the end of next year. The admiralty, in placing the contract with the Vickers company had, no doubt, in their mind the successes of the company, alike as regards rapidity of construction and realization of speed results. It is understood that the new battleship will have four sets of turbines for going ahead, each mounted on a separate shaft, so that there will be four shafts and four propellers, the total power being between 22,000 and 23,000 H. P.; this, it is expected, will give the vessel a speed of 20½ to 21 knots, a rate which, in view of the enormous gun-power—ten guns of 12-in. calibre—and the adequacy of the armor protection, is exceptionally satisfactory. In addition to the four go-ahead turbines, there will be astern turbines on each of the shafts. In order to secure high economy at low power this battleship will have a similar arrangement of cruising turbines to that which proved so satisfactory in the third-class cruiser *Amethyst*; that is to say, there will be an independent high and low-pressure system of turbines for low speeds, and these will exhaust into the high-pressure main turbine. For intermediate speeds the high-pressure cruising turbine will be cut out, and steam passed from the boilers into the second cruising turbine, and thence into the high-pressure main turbine system. This, as in the *Amethyst*, will give a very considerable range of expansion at almost any power. The boilers to be used will be of the Babcock & Wilcox water-tube type, working to a much higher pressure than has hitherto been the case in steam-turbine machinery, excepting only the *Manxman*, the Midland Railway steamer built by the Vickers Co.

LOUISIANA AND CONNECTICUT CONTEST

President W. A. Post, of the Newport News Ship Building & Dry Dock Co., which is constructing the battleship *Louisiana*, was in Washington last week consulting officials of the Navy Department. Commenting upon the contest between his company and the government in the construction of the sister ships, *Louisiana* and *Connecticut*, he said:

"In my opinion the two vessels will be completed about the same time. Although various things have handicapped us in the race, I think that when the work is completed on the two vessels and the whole matter analyzed we will find that the test has been distinctly in our favor. It is true that the Brooklyn navy yard has been doing good work, and that it is putting up a good vessel, but it has the entire resources of the Navy Department behind it. It is concentrating every energy to go out ahead, but we do not fear the result. We have carried all our work ahead as usual, and on the Minnesota we are over a month ahead of contract time. The main difficulty we have to encounter is the red tape involved in the inspections by the department. The navy yard goes ahead and builds the *Connecticut* without any inspection, while we must wait to have everything approved before we can go ahead, and this throws us back considerably. But we are not bothering. When the end comes and the whole matter is looked into, we are sure that we will have nothing to lose by the analysis. The navy department has always been satisfied with our work."

The navy department has been informed by the New York Shipbuilding Co., Camden, N. J., that it will launch the 16,000 ton battleship *Kansas* on Aug. 12.

In Behalf of Our Merchant Marine

Mr. Harvey D. Goulder, president of the Merchant Marine League of the United States, recently addressed the following communication to the Boston Herald in reply to an editorial which that paper had published:

"In your July 7th editorial on merchant marine you kindly say that to quite a degree I possess the enthusiasm of a new convert. I have been in this movement for years, and hope to be so favored that when the American flag overcoming indifference, selfish foreign influence and all specious argument shall return again to its place on the seas, I may be living and still entitled to the encomium of such enthusiasm. We must all, in the first place, recognize the wisdom, in dealing with such a far-reaching question, to plant our feet wherever we can on exact, or nearly exact, facts. Your suggestion is of free ships, eliminating or subordinating the question of cost in operation. If this is the true method, and feasible, let us have it, but let us consider carefully whether it is.

Along a somewhat similar line of thought we have a number of editorials, asserting, without qualification, that if we could have free materials for ships to engage in the foreign trade the problem would be solved. For fifteen years we have had free materials. A ship may be built for the foreign trade or trade between Atlantic and Pacific coast ports of the United States from keel to truck of foreign material free of duty, and materials for her repair may be brought in without a cent of duty. More than this, such a ship may engage for two months of the year in the coasting trade. The decadence of our foreign marine during the past fifteen years would seem to dispose of the free materials remedy, and leads to a question of the advisability of the enlargement of the coasting privilege in the proposed bill.

"The question of free ships brings us up against some important considerations. It would be a pity and unjust to make this movement of the merchant marine the particular wedge of a general free trade policy, and we do not, therefore, care or feel obliged to discuss overmuch this problem, in which must be involved the question of putting our labor on a par with that of foreign countries.

"You had in Boston a very striking example that the additional cost of building a ship in this country is in wages, when in 1900 transient conditions made the price of steel ship plates 45 percent higher to the British than the American shipyard, and a Boston concern received bids from a British and from an American shipyard. The price of material was \$17,000 in favor of the American builder, but the bids for the completed ship were in Britain \$214,000 against \$275,000 in this country. We lay aside demagoguery in saying that general conditions of remuneration of labor in this country must apply to ship building whether on the lakes or the seaboard. The proposition of free ships must, therefore, depend in its inception upon the fundamental idea of a horizontal reduction of wages throughout the country in all avocations, or the definite abandonment of the ship building industry, at least so far as applies to oversea trading ships. With equal reason the same idea may be applied to our warships and yachts, which at present are the types of ocean going ships which we build.

"The elimination of the ship building industry for oversea trade, capable of affording employment for tens of thousands of men and millions of capital, would be a fearful cost; and, looking it squarely in the face, the American people will not actively sanction it, though

our shipping may continue to decline as we shall go on by acts of omission depending on business rivals to extend our trade at their expense. But where is there anything beyond assertion that free ships would cure or even palliate the evil? Assertion has been as profoundly and as positively made about the free materials remedy during the years that it has furnished so little aid and attracted so little interest that few know of its existence. If the American people were willing to assume the responsibility of destroying one great industry and setting such an example, where is the reasonable prospect of relief in free ships?

"Without having spoken with either of them on the subject, I mention at random Mr. Alfred Winsor, Mr. Eugene Nelson and Capt. J. G. Crowley as men among others in your city who should be able to give you reliable information on the comparative cost of operating under our own and foreign flags.

HARVEY D. GOULDER.

President of the Merchant Marine League of the United States.

Cleveland, O., July 11, 1905.

ADVOCATING FREE SHIPS.

The Herald discusses Mr. Goulder's communication in the following language:

"We regret that the chief executive officer of this organization does not take up for consideration in his letter several points which we made relative to the American merchant marine as it has been developed within his own immediate neighborhood. He refers us to certain gentlemen in this city for information concerning the comparative cost of operating ships under our own and under foreign flags. We do not consider that we need enlightenment on that score; but what we called to Mr. Goulder's attention was the fact that the cost of operating steam vessels upon the Great Lakes, on the basis of transportation per ton per mile, from the time of taking on board to the delivery of freight, was lower than the cost of freight transportation by water in any other part of the world, and this although the officers and crews of these lake craft are higher paid for their duties and better fed than men similarly employed in any other maritime service. As Cleveland is perhaps as prominently identified with the lake shipping business as any port on the Great Lakes, Mr. Goulder, if he was ignorant on this subject, might, before he wrote to us, have taken the trouble to enlighten himself; for we recognize, as he says, the wisdom in dealing with such questions of planting 'our feet, wherever we can, on exact or nearly exact facts.'

"What we maintain, and what experience all over the world conclusively proves, is that the rate of pay given to men per hour, per day, per week or per month is absolutely no guide to the labor cost of the services they perform. An American workingman may be paid \$10 a day, and yet to those who employ him his services may be far cheaper than would be those of men who are paid a dollar a day—that is, the employer would make more money by hiring this \$10 man than he would by hiring a dollar a day man, or even ten of the latter combined. This fact is so obvious in everyday business experience that it becomes wearisome to have men engaged in any national movement argue their point as if it did not exist.

"Equally trivial and aside from the main subject is the attempt to make it appear that the free ship proposition

is simply a part of a general free trade policy. Whether general free trade would or would not be productive of industrial advantage to the United States is something which at another time we might be willing to argue with Mr. Goulder or with anybody else; but this has absolutely no bearing whatsoever on the question of whether American ship merchants should be permitted to purchase and sail under the American flag foreign-built ships when the services of these are limited strictly to international voyages. Germany and France are nations which have adopted and applied protection systems; but that does not stand in the way of the German and French ship merchants having ships built for them, when they so wish it, in Scotch and English shipyards.

"What amount of American labor is there, we ask Mr. Goulder, that is occupied in building American ships that are to be engaged in foreign trade? We doubt if at the present time there are, out of the eighty odd millions of American citizens, 500 persons who are thus employed, and these are the only conceivable Americans whose labor could be interfered with by an adoption of the free ship plan of maritime rehabilitation. For this reason, to talk of "a horizontal reduction of wages throughout the country in all avocations" is pure rhetorical buncombe; while to speak of the definite abandonment of the ship building industry in view of the protection accorded to coastwise business and the shipping upon the great lakes is equally trivial and absurd. So far as this abandonment 'applies to overseas trading ships,' the abandonment practically took place years ago.

"We earnestly wish for the resuscitation of the American merchant marine, but from what we realize is a much more comprehensive knowledge of the subject than that which Mr. Goulder possesses, we are confident that this revival can never be brought about by any system of government subventions. The insuperable obstacle is the great initial cost of American ships, and when these, with their necessary rapid deterioration, are brought into competition on the high seas with the low cost merchant tonnage of foreign nations, they are inevitably pushed to the wall.

"Wishing, however, to compromise matters as far as possible, we have several times made the proposition that we would be entirely willing to give our support to a plan of granting a general subsidy to American-built ships employed in foreign voyages, provided this grant was accompanied by full permission for American merchants to purchase foreign-built ships and sail these under the American flag, with the clear and distinct understanding that the vessels thus purchased were not to receive a cent of subsidy from the government, nor were they to be permitted to enter into our coastwise trade. We have time after time suggested this proposition as a compromise, which would permit both methods of rehabilitation to be worked out side by side for the purpose of letting the better method win, feeling so entirely confident that the free ship plan would in the end prevail that we have had no hesitation, in view of the general commercial advantage that would thus be secured, in having the millions of dollars a year needed for subsidy paid out of the United States treasury to our subsidizing friends.

"It is an illustration of the want of faith of these latter in the general efficacy of their own method that practically none of them have been willing to have the two systems thus tested side by side in a way in which the apparent advantages would be all upon the side of the subsidized shipping. We make this suggestion to Mr. Goulder to find out whether he is prepared to harmonize differences in this manner. He asserts in his letter that if free

ships constitute a true method and feasible, let us have it. The way to test this is by trying it, and, as we said above, trying it, if need be, in conjunction with a general subsidy for American-built ships. If this dual plan of action were adopted by the Merchant Marine League of the United States, it would obtain assistance for its cause in a great many quarters where it cannot now look for help; but thus far the treatment of this great commercial problem, in its governmental aspects, has been chiefly controlled by those who are determined that we shall have no deep sea merchant marine unless they build the ships to which American registers are given."

DISCRIMINATING DUTIES ADVOCATED.

William W. Bates, in *The Arena Magazine*, advocates discriminating duties for the American ship. "It is not bounty," says he, "but business, that is essential to our carrying trade. The carrying of freights belonging to our vessels is wanted. A preference to obtain this is necessary. That preference will abate the excessive competition in the carrying trade which was created by the adoption of the present policy, and which inevitably attaches to it. Foreign shipping admitted to our trade must again be handicapped by regulations—extra tonnage and tariff duties—to the point where our own may be preferred.

"Justifiable discrimination at the custom house will secure employment to our vessels now, as it did a century ago, and there is no other principle available for a system of ship encouragement that can be relied on continuously, without violation of the constitution. It is, as we have shown, the bounden duty of congress to apply this principle now, as it did a century ago, but having just refused to do so, it is necessary and urgent for the patriotic citizens of our country to exert themselves to cause a change of disposition and the execution of duty, if not by the ruling party, then by a change of rulers.

"The American ship must come forth again; our dependence on foreign shipping has long been so costly, disadvantageous and disgraceful as to stir the ashes of every signer of the Declaration of Independence, and of every patriot that helped frame our constitution and planned, as they all thought, to secure forever an American marine for American commerce."

And while so much eloquence is being expended upon the American ship, let us devote just a little to the American sailor. In Seattle to-day there is an American-born ship master who served thirty-one years in the employ of a big trans-Atlantic company whose vessels fly the American flag. At the end of that period, the controlling stock in the company having passed into the hands of some British capitalists, he was released from further duty and an English sea captain installed in his place. How did this Englishman get American papers enabling him to command this vessel and why were they given him? Are our navigation laws defective?

It is now a notorious fact that the big trans-Atlantic steamship companies will not employ an American captain aboard their ships, although the true American navigator has not his superior in handling a ship upon any of the waters of the earth. These companies haul a vast amount of American freight and thousands of American lives upon every voyage—and yet, with all this American tribute continually being dumped into their coffers, not an American shipmaster is allowed to guide their vessels across the sea!

And right here on the Pacific—even in this patriotic and intensely-American city of Seattle—we find the same thing. Two large vessels plying out of this port and

CONTINUED ON PAGE 28.

ELECTRICAL EQUIPMENT SAULT POWER CANAL

In the *Engineering World* is an article descriptive of the electrical equipment of the power canals at Sault Ste. Marie. The article says that the minimum flow of water over the falls, with a 20 ft. fall, represents about 120,000 H. P. The present development dates back ten years, when the Michigan Lake Superior Power Co. acquired the property, about ten years ago.

A right of way between the principal business and residence portions of the town, 400 ft. wide and extending about 2 1/3 miles from above the entrance to the government ship canal to a point about a mile below the rapids, was acquired by purchase with a great deal of other property for manufacturing sites.

During the construction, land on both sides of the canal near the intake from Lake Superior and around the power house on the St. Mary's river, was reclaimed to the extent of about 250 acres by dumping waste material. Nearly a mile of the canal on the western or upper end was channeled and blasted through red-veined sandstone. This stone was dumped in spoil banks and quarried for use in building the power house, paving the slopes of the canal, or ground up for concrete block and monolithic masonry.

In the rock section the canal is 200 ft. wide and 25 ft. deep, with vertical sides. The sections through gravel and clay are piled and lined with plank upon sills which are drifted onto the piling. These sections are about 225 ft. wide and 23 ft. deep, with sides formed with one or three slopes, according to the material passed through.

The intake end of the canal is closed and controlled by four Stoney sluices, forming what is known as the movable dam. This dam is constructed of concrete piers and deck with steel superstructure for supporting the raising mechanism of the gates. The gates themselves are counterbalanced to facilitate handling and work in steel slots built into the masonry. A duplicate of the movable dam was erected at the head of the rapids in the deepest part so that a section of about the same size of the canal could be closed and the water diverted through the canal without changing the levels above or below the rapids. The intake section was contracted for and built by W. H. Hubbell & Co., West Bay City, Mich., and the canal proper by E. D. Smith, of Philadelphia.

East of the movable dam, the Duluth & South Shore and the Soo lines cross on a steel girder and stone-pier bridge. The canal is also crossed by six steel truss-bridges for street use. Just below the last bridge at Portage avenue is the main screen or ice rack at the entrance to the forebay. The rack is of steel and shaped like a letter V with the point downstream, the sides also inclining downstream at an angle of 45 degrees. From the point of the "V" to the center of the power house, a sluice-box carries floating refuse and ice when the gates are raised. The forebay widens out from 225 feet, the width of the canal, to about 1,400 feet, the length of the power house, which acts as a dam between it and the river.

The power house is built on piling driven through the clay to solid rock and capped with grillage and three feet of monolithic concrete, which forms the floor of the tailraces. The tailraces are each 16 ft. 6 in., center to center, and divided from one another, and closed at the upper end by concrete block masonry of interlocking design. The main floor of the power house, forming the top of the tailraces, is of monolithic concrete arches supported on the dividing walls of the races.

Above this point, all construction is of steel except the outer walls, which are of coursed rubble, using the red-veined sandstone from the canal, with arches and string courses of concrete blocks finished with ground stone to match the rubble.

The main floor is divided longitudinally into two, the south side forming the penstocks for the turbines and the north side the generator room. It is divided also into 81 units or

penstock divisions, 80 of which are used for the power units consisting of turbine and generator, while No. 43 is the spillway connected to the point of the "V" shaped ice rack before mentioned.

The walls between the penstocks are of concrete steel and the bulkheads between the penstocks and the generator room are of semi-circular steel plate construction, so arranged that all the plates are in tension. The penstocks are open on the south side to the forebay. Just north of the bulkhead is a 6-m. pile partition to protect the generator room from dampness caused either by leakage or sweating of the steel bulkhead.

Two upper floors provide space of about 200,000 sq. ft. for manufacturing plants renting power. The power house structure was built under contract by the Mason & Hodge Co., of Frankfort, Ky.

The water turbines are of the McCormick immersed type, with four 33-in. wheels on one shaft forming a unit. The wheels are arranged in pairs in cast-iron turbine casings so that the two wheels in one casing discharge inwardly into the same sheet steel draft tube. Balanced gates, surrounding each wheel, are operated by Lombard governors in the generator room. These governors are each fitted with a regulating motor so that any turbine can be instantly started, stopped, or regulated from the switchboard. With a head of 16 feet, each turbine unit (4 wheels) will develop 400 Kw. at 180 R.P.M. at the generator with a flow of 390 cubic feet per second and a generator efficiency of 94 percent. This represents a turbine efficiency of 82 percent, and this figure was beaten in several of the tests at the Holyoke testing plant.

The turbines were built and installed under contract by the Webster-Camp & Lane Co., of Akron, O. (now a part of the Wellman-Seaver-Morgan Co. of Cleveland). Mark A. Reprögle was in charge of the erection for this company, while Mr. Erskine H. Cox superintended the erection for the power company.

The electrical installation is somewhat unique, as, apart from the problem of handling 32,000 Kw. of generators, the units are small on account of the low head of water. The size fixed by the turbine conditions was 400 Kw., so that 80 generators are needed, extending about 14 feet more than a quarter of a mile from the center of the shaft of No. 1 to the center of the shaft of No. 80. Units 1 to 42 are rented and operated by the Union Carbide Co., which is also one of the largest users of power at Niagara.

Units 1 and 2 are equipped with a Westinghouse two-phase, 60-cycle, 220-volt, 180-R.P.M. generator. These units are governed by Sturgess independent governors and are fitted with the ordinary marble switchboards to supply current to the various induction motors which are in use in the Carbide company's plant. Units 3 to 42 are equipped with Westinghouse single-phase, 60-cycle, 90-volt, revolving-field, 180-R.P.M. generators for supplying the Carbide furnaces with low tension current. All of these generators are supplied with marble switchboards (in a narrow gallery above the generators) with heavy hand-operated switches for tying them to the furnace bus-bars. Each furnace is fitted with a Horry regulator, which maintains a constant amperage so that the turbines work constantly at full gate opening without a governor. In case the load becomes disconnected accidentally or the generators lose their field, the wheels will speed up to about 340 R.P.M., but the revolving fields of the generators are built to stand this extra centrifugal strain without damage. Nos. 41 and 42 are fitted, besides the generators just mentioned, with 400-Kw., direct-current, 220-volt, compound-wound, exciting generators coupled to the free end of the single-phase generator. One of these is enough to excite the whole of the Carbide company's plant, and the dual arrangement permits using the other turbine on the single-phase load. No. 43 was mentioned before as the spillway. Nos.

44 to 81 are used by the power company, and, although only partly installed, the plan covers the whole installation so far as the switchboard, generators, transmission, etc., are concerned. As power is rented, the installation progresses.

The generators installed at present were supplied by the Stanley Electric Manufacturing Co., of Pittsfield, Mass. They were represented on the ground by Mr. E. O. Sessions. Three-phase, 30-cycle, 2,400-volt, 180-R.P.M. revolving-field generators with 95 percent efficiency and 7 percent regulation are used, excited at 220 volts.

Three 400-Kw., direct-current, 600-volt, compound-wound (with adjustable shunt from 1 percent to 10 percent over-compound) generators supply current for the street railway. The base, pedestal, shaft, coupling, etc., of these direct-current generators are interchangeable with those of the alternating-current generators. The exciter units are 100-Kw., synchronous motor-generators with 2,400-volt revolving-field motors and 220-volt compound exciting generators. The motor-generators ordinarily are started from the direct-current end with 3-step resistance in the armature circuit.

A 100-Kw.-hour storage battery is also provided to regulate the exciter circuit and supply exciting current if the exciters are shut down for any reason.

The switchboard arrangements are the most novel features of the plant, as *the whole of the starting, stopping or regulating of all units is done at the switchboard by one man, as well as the manipulation of all the switching apparatus.*

To accomplish this, only pilot and indicating circuits are brought to the operating switchboard, all the regular rheostats, oil switches, etc., being located near the generators themselves. The power units are divided for switchboard purposes into three sections and each section provided with an upper and lower set of bus-bars. The circuits are distributed along the bus-bars, as far as possible joining them at the same points as the generator leads, so that practically the bus serves only to carry the cross or equalizing current and hold the units in synchronism instead of transmitting the whole amount of power. The sections are tied together ordinarily by oil circuit breakers so that only one section would be affected by an accident or short circuit. Ordinarily, half of each section is on the upper and half on the lower bus, making practically six sections. Three oil switches for each generator and feeder are so arranged that two operate as selector switches to either the upper or lower bus before the remaining one is thrown. Two switches are always in series on the circuit and both open together when the circuit is interrupted either automatically or from the switchboard.

All the oil switches are solenoid operated of the type that hold in by the action of the solenoid and release whenever the solenoid current is interrupted. Switches in the pilot circuit are provided at the generator and oil switches, so that, in case of accident or inspection, the oil switches can be open from any point and their control taken automatically from the switchboard. This is in a line with automatic block-signal practice, in which any failure of electric circuits is on the side of safety and it is an excellent idea to carry out in switchboard design. Beginning at the top of each panel of the operating switchboard, there is a short panel, devoted to one outgoing feeder, with ammeters of the edgewise type in each leg of the three-phase circuit.

At one side of these three instrument dials is the pilot switch controlling the main-feeder switch. This control switch, when thrown up, connects its feeder to one set of bus-bars and, when thrown down, to the other set. Energizing the solenoid will close the circuit breaker, but this will immediately open again in case there is a short circuit. In case the pilot-circuit switch is closed in such a position as to close the main circuit breaker, and the circuit breaker is open, a green lamp is lighted below the pilot switch on the board. This green lamp is lighted as long as the circuit

breaker is open and the pilot switch closed. If the pilot switch is open, the circuit breaker will necessarily be open and the green lamp will not be lighted.

Immediately below the feeder panel are two generator panels. Beginning at the top, each generator panel has an indicating wattmeter, at the side of which is the double-throw pilot switch, controlling the solenoids of the main operating switch and circuit breaker, which is of the same type as that just described for the feeders. Next below this is an edgewise ammeter, in one leg of the generator circuit, at one side of which is a voltmeter switch. This voltmeter switch is for the purpose of connecting the generator to a voltmeter located elsewhere on the switchboard. There are two voltmeters on the board, one of which is permanently connected to the bus-bars, and the other one used only when a generator is being started up. The voltmeter switch will spring back to off position as soon as the attendant lets go of it. Next below the generator ammeter on the board is an edgewise ammeter in the field circuit of the generator. This ammeter has beside it a switch by which the attendant at the board can regulate the speed of the water wheel driving the generator and can also start or stop the wheel. The principle of this control is very simple. A small direct-current motor is attached to the Lombard water-wheel governor so as to change the relative opening of the gates at a given tension of the governor balls. By rotating the motor in one direction the gates are opened wider with the governor balls in a certain tension and, by rotating it in the other direction, the reverse action takes place. In starting up and increasing the speed, the attendant holds in the switch, which will cause this motor to revolve to open the gates wider. The motor will run to open the gates as long as the attendant holds the switch closed, but the switch will open as soon as the attendant lets go of it. The attendant can, therefore, bring the machine into exact synchronism without leaving the switchboard.

One very important feature of the way this switchboard is arranged is the facility with which the attendant can note any variation in the load carried by the several machines in operation. The dials of all the indicating wattmeters and ammeters being very close, side by side, like instruments being in the same horizontal plane and provided with scales of similar dimensions, it is easy to note the relative position of the pointers on the same kind of instruments clear around the switchboard. To facilitate this, the pointers are made broad and tapered to a point at one end for accurate reading of the scale. When the load is equal on all the generators, the wattmeter needles should show a continuous unbroken band around the length of the switchboard and a variation on any instrument is easily noted by the break which it would cause in the line. The same thing will hold true with the ammeters in the field circuits of each generator. If the current in the field circuit of each generator is the same, the only thing which could cause a variation to the load, taken by the different generators, would be a lack of sufficient gate opening on the turbines to hold a generator fully up to synchronism, or the reverse. In order to make the generator take its share of the load, the attendant would only have to hold his speed-regulating switch up, so as to rotate the synchronizing motor for a few seconds, to change the governor adjustment and give a greater gate opening on the turbine driving that generator. The compactness and completeness of this switchboard commend themselves to every electrical engineer who has had to do with the switchboards of large power stations.

On each generator is an emergency switch, as it is called, by which a man on the generator-room floor can open all the circuits leading to any generator in case of trouble. When this emergency switch is open, a red

lamp is lighted on that generator panel. In addition to the red and green lamps on the generator and feeder panels for indicating the opening of the circuit breakers and emergency switches, all these signal circuits are connected to gongs which ring whenever a lamp lights. The green lamps, indicating the opening of the circuit breakers of either the feeder or generator circuits, are accompanied by the ringing of an 18-in. gong and the red lights, indicating the opening of an emergency switch are accompanied by the ringing of a 24-in. gong. All secondary circuits from potential and series transformers for operating indicating instruments are grounded on one side as a safety precaution to prevent possible damage from the 2,400-volt generator current in case of a cross between the transformer primary and secondary coils.

For transmission to neighboring industries, 15,000 volts has been adopted as the standard, and the transmission lines are run as far as possible along the company's canal. The transmission lines are put on 60-foot Idaho white cedar poles, 90 feet apart, and mounted on Locke No. 3 insulators. The step-up transformers are 400-K. W., water-cooled and oil-insulated.

Mr. W. Owen Thomas, the electrical engineer of the plant during construction and afterward superintendent, is responsible for all the electrical features given. Mr. Thomas now has a consulting office at 645 First National Bank Building, Chicago.

In Behalf of Our Merchant Marine

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flying the American flag are commanded by men who are reliably stated to be naval reserve men of the British navy—owing and giving allegiance to King Edward and yet holding American papers that authorize them to command two of the finest ships that are to-day listed in the American merchant marine. Is this right? Is it patriotic? Is it American?

Take a look at the vessels that ply out of Seattle and San Francisco—see how many of them flying the American flag have American masters. When you have recovered from the shock incident to the discovery that subjects of Kings Edward and Oscar have almost entirely supplanted the Yankee skipper, go to your senator or congressman and insist upon a change in this order of things. Insist that the navigation laws of this country be so amended and enforced that no man shall command an American ship who is not an American-born citizen, or, whose naturalization papers have been issued for a shorter period than five years.

A howl continually goes up from Washington City that we are short of officers and men for the navy, and yet congress passes no laws for the encouragement even of the men in our merchant marine, much less of our navy.

Every state in the Union with a coast line should have a small fleet of vessels provided partly by the state and partly by the general government for the training of officers and men. These ships could be graded in size and importance and could be made to do police duty and also take the place of the revenue cutters and launches, as well as to form a part of the auxiliary fleet of our navy, and they could also be used for the carrying of such merchandise and mails for the government as are now let by private contract.

The ship-masters throughout the country have associations for their mutual benefit and protection, but these organizations have so far been unable to accomplish much in the way of legislation for their own protection—and the reason is obvious. The true seaman is an

"honest old salt" who is unable to cope with the duplicity and chicanery of the politicians or with the persuasive cunning of the financiers who now control the big steamship companies of the world.

But something has got to be done for these men—these "Yankee skippers and their crews," or the day will come when the American merchant marine will be dependent upon Norway, Sweden, or England for men to man the ships that fly Old Glory.

MECCA FOR AMERICAN TRAVELERS IN LONDON

This is the season when the rush of trans-Atlantic travel is at its height. Steamship managers estimate that 150,000 cabin passengers will go eastward across the Atlantic from all ports this year. The great fleet of steamships leaving New York carry approximately 25,000 cabin passengers a month during the four busiest months of the year. This makes a total of 100,000. The other 50,000 sail from different ports, went earlier, or will go later. These figures are estimates based on careful computations made for the year 1903, which showed that 118,096 cabin passengers left the port of New York for Europe in that year, which was one of depression. After two years of prosperity, it is reasonable to suppose that the over-sea rush this year will be a record breaker. Foreign exchange experts agree in saying that for the last five years \$100,000,000 a year have been spent by the American tourists abroad. They place the average expenditure at \$1,000 for each traveler. This may seem extravagantly high, but it is due to the fact that a comparatively few spend a great deal more than \$1,000 on their trips abroad. At this rate, the summer vacations of the 150,000 foreign tourists this summer, will cost \$150,000,000, \$37,500,000 of which will be paid for passage money, according to an estimated average of \$250 for the round trip. The average tourist spends abroad three times the cost of his round trip ticket.

About nine out of ten of these Americans abroad, will wend their way, sooner or later, to the new Cockspur building just opened in London, which contains the offices of all the lines combined in the International Mercantile Marine Co., better known as the shipping combination. Heretofore, the steamship offices in London were scattered broadcast. Now they are concentrated in the Cockspur building, located in a place easy of access, a block or two from Trafalgar square. Anyone can find Trafalgar square, and therefore anyone can find the place where he must go to fix up his steamship tickets and arrange other details of his trip abroad.

This new Mecca for the American tourist in London is American all the way through. It was put up by American builders with American materials, and is classed among the best examples of the modern types of architecture which are springing up in the midst of old London. The speed with which the building was run up was the marvel of the day in London, and its completion a few weeks ago was made the occasion for a good many hard knocks about the deliberate methods of British builders. The building is a steel frame structure, the hollow-tile fireproofing material for which was imported from Perth Amboy, N. J. One of the first fireproof buildings erected in London on an American model, is attracting a good deal of attention from English builders, and partly as a result of this and partly because American fireproofing has lately passed severe tests at the hands of the British Fire Prevention Committee, American steel frame, fireproof construction is sharing largely in the building boom now in progress in London.

AROUND THE GREAT LAKES

The steamer City of Rome, which was in collision with the Linden in the Detroit river, has been taken to Cleveland for repairs.

The old steamer H. C. Winslow, which sunk in Chicago river near the Dearborn street bridge a few weeks ago, has been broken up.

Vessels are having trouble in getting an adequate supply of deck hands this side, and a few of them have had to leave port shorthanded.

A new chart in colors of the north end of Green Bay has just been issued by the United States Survey and is now on sale by the Marine Review.

The receipts of anthracite coal by lake at Chicago to date are light, being approximately 248,678 tons, or 66,500 tons less than up to July 15 last year.

The barge J. Smeaton, from Duluth to South Chicago, carried 8,201 gross tons on a draught of 19 ft. 4 in. last week. This establishes the barge record.

A meeting of the International Waterways Commission is to be held in Buffalo on Sept. 11 and 12, to consider the proposition to dam the outlet of Lake Erie in order to raise its level.

Mr. T. M. Brown, deputy collector of customs, who has been at the river office, Cleveland, for a number of years, has been transferred to the main office, and Mr. H. T. French takes his place.

Major Lansing H. Beach, for four years light-house engineer in the eleventh district, with headquarters at Detroit, has been ordered to report at Fort Leavenworth, Kan., as instructor in the department of engineering.

The steamer Castalia, which was lengthened 72 feet at the Cleveland yard of the American Ship Building Co. during the spring, has just loaded her first cargo at Duluth. She took on 4,809 tons, which is 1,336 tons more than she ever loaded before she was lengthened.

The steamer Hoover & Mason has been delivered by the Great Lakes Engineering Works of Detroit to her owners. She will carry steel corporation ore during the balance of the season, and the unloading of her initial cargo will be watched with great interest.

During a dense fog last week the Gilchrist steamer Neshoto, bound down with ore, and the whaleback steamer James B. Neilson, upbound, collided at a point about ten miles outside of Portage Lake Canal. The upper works of the Neshoto were badly stove in. The Neilson was not damaged.

An experiment of a great deal of importance to vessels was successfully tried at the Illinois Steel Co.'s plant last week, when the big steamer Augustus B. Wolvin was landed on the south slip. The successful trial opens the full dock facilities of the Illinois Steel Co. for vessels of the largest class.

The old passenger steamer Peerless, formerly the flagship of the Lake Michigan & Lake Superior line, was sold at marshal's sale in Chicago last week. She brought \$2,000. Capt. George P. McKay of Cleveland, the present treasurer of the Lake Carriers' Association, brought the Peerless out.

The new steel tug Frank Perry was launched at Johnston Bros. yard, Ferrysburg, Mich., last week for the Perry Co. of Sault Ste. Marie. The Perry is 141 ft. long, 25 ft. beam and 13 ft. deep. She will be engaged in towing pulp logs from Lake Superior points to Bay City, and will be in command of Capt. Fred Ryerse, St. Ignace.

The Pittsburg Steamship Co. has begun suit to recover \$41,000 damages for the steamer Sylvania in the United States district courts of Cleveland. The suit is the result of the injuries sustained by the steamer Sir Henry Bessemer in collision with the Sylvania off White Fish Bay on June 13. Of the damages asked, \$35,000 is for injuries to the

boat and \$6,000 for loss of profit for thirty days while the Bessemer was out of commission.

A delightful romance of a young business man of Buffalo and an ideal summer girl with lustrous eyes and glowing cheeks. This story is enacted while en route on a D. & C. steamer and at Mackinac Island. It tells, in an interesting way, what was seen by the moon, and a little bird heard in the land where cool, bracing breezes always blow. Sent to any address for a two cent stamp, upon request, to A. A. Schantz, general superintendent, Detroit, Mich. •

As a result of the governmental investigation of the sinking of the steamer Thomas W. Palmer by the steamer Harvard in Lake Superior, the license of Capt. Secord, of the Harvard, has been suspended for sixty days. Violation of the rule governing the operation of a steamer in a fog is the reason for the suspension. As a result of it a number of captains of the Pittsburg Steamship Co.'s fleet changed boats. Capt. James Burr of the Mariposa goes to the Empire City; Capt. A. A. Robinson of the Empire City goes to the Harvard, and Capt. W. A. Reed, who has been acting as first mate on the Manola, has been appointed master of the Mariposa.

The annual convention of the International Longshoremen, Marine & Transportworkers' Association is being held at Detroit this week. President Livingstone of the Lake Carriers' Association addressed the convention on the opening day and made a pronounced hit. He was warmly thanked by President Keefe for his remarks. President Keefe's address was very lengthy and discussed a great variety of topics. The Longshoremen's association has now reached a membership of nearly 100,000 in 691 locals. During the past year sixty new local unions have been organized, twenty-nine of them on the great lakes. The attendance at the convention was light, owing to the fact that there were practically no grievances to be discussed.

At the last convention of the International Longshoremen, Marine & Transportworkers' Association at Detroit last week, the policy of bi-ennial conventions was adopted. D. J. Keefe was elected president, and Henry C. Barker, secretary and treasurer. The executive committee changed considerably by the election of five new vice-presidents, as follows: John J. Joyce, of Buffalo; C. A. Bush, Cleveland; J. A. Jordan, North Tonawanda; J. W. Thompson, New Orleans; L. H. Sanderson, Toronto; Wm. H. Martin, Conneaut; L. E. Fales, Havana, Cuba; O. A. Anderson, Galveston. The delegates elected at the next annual convention of the American Federation of Labor were President Keefe, Secretary Barter, C. Wild of Buffalo, president of the Marine Firemen, Oilers and Watertenders' association; Thomas Harrison, of New Orleans, state labor commissioner for Louisiana, and James Walsh, of Duluth, president of the Licensed Tugmen's association.

"The Yantic proved one of the meanest vessels to release I ever saw," remarked Capt. C. H. Sinclair, who had charge of the work on the stranded naval reserve ship. In the first place, her hatches are not arranged with reference to handling cargoes, and we were compelled to lighter out her ballast in the most roundabout way imaginable. The nature of her rig and the way in which the chains set out from the sides also interfered with the operations. The vessel had settled into the blue clay about a foot, and was out nearly 18 inches at that. Although we worked energetically with the tugs, we could not pull her over into the cut which had been dredged out for her. Finally I stationed the tug Lorman on her port side and the dredge on the starboard side inshore, and ran a chain around her bows from one to the other. Moving the tug back and forth we swept her keel, the chain cutting three inches into the clay at every sweep. In that way we finally removed enough bottom to slide her over into the ditch. The lower buoy at Fighting island has been replaced. It is suggested that the absence of this mark may have had something to do with running the Yantic on shore.

SUBMARINES

By Sir William H. White.*

French official documents distinguish between submarine and submersibles, but there is no real difference of principle in their respective design. Both classes are capable of entire submergence and under water propulsion. The distinction between them consists in the larger reserve of buoyancy and higher freeboard of the submersible type when floating at minimum draught. As a consequence the submersible type enjoys better conditions of propulsion and habitability when on the surface, while the amount of water which has to be admitted into tanks before submersibles are ready for diving, is necessarily greater than the corresponding admission for submarines. Many of the latter type are of relatively small dimensions, but some submarines are of large size and have been furnished with light forecastles and flying bridges for the purpose of securing both accommodation for their crews and assisting propulsion at the surface. It was anticipated, and, indeed, it seemed probable that the submarine type would gain upon the submersible in the time required to pass from the surface condition to the diving condition; and it was held that such a gain in rapidity of diving might be of great value on service. Trials made recently with representative vessels of the two types have, however, led to the conclusion that the submarine type does not gain sensibly, if at all, upon the submersible in this particular; whereas the submersible has been proved to be much superior in regard to surface-propulsion, maneuvering-power, and habitability. Two vessels were tried at Cherbourg in March last before a special commission, presided over by Admiral Philibert—the Aigrette (submersible type) and submarine Z. The Aigrette is a vessel about 118 ft. long and of 170 tons displacement, with engines of 200 H. P. and an estimated surface speed of about 10½ knots. Submarine Z is about 136 ft. in length, of 200 tons displacement, with engines of 190 H. P. intended to secure a surface speed of 11 knots. A small fore-castle was built at the forward end of Z to house the torpedoes and to assist propulsion, while a light flying bridge was added in order that the crew might obtain fresh air in the surface condition. Detailed reports of the trials have appeared in *Le Yacht* and elsewhere; from which the Aigrette appears to have been superior to her competitor in maneuvering power, in steadiness, and in speed, much more comfortable for the crew, and more rapid in preparation for diving. The superiority in behavior of the Aigrette is said to have increased as the wind and sea rose. As the result of these trials it is anticipated that the submarine type will give place to the submersible type except for coast or harbor defense, wherein a small radius of action suffices. For offensive work, requiring a larger radius of action, the submersible type is considered necessary. French writers are of opinion that large submersible vessels might be employed in attacks on an enemy's coasts, both in the Northern Seas and in the Mediterranean; vessels of about 400 tons and 600 H. P., attaining a surface speed of 12 knots, are regarded as satisfactorily fulfilling the requirements. Further, it is held that for harbor and coast defense, vessels of about 100 tons displacement should suffice. Besides these two types some authorities recommend the construction of a third type of small submarines which could be lifted on board and carried by ships, much as second-class torpedo boats and vedette boats are carried in battleships and cruisers. Special lifting appliances must be provided, so that the submarines might be put afloat quickly in a condition ready for immediate service. The French have already dispatched some of their smaller submarines (about 77 ft. in length and 68 tons displacement) to Saigon in order that they might form part of the *defense mobile*, and no difficulty was experienced in their transport. A small experimental submarine

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specially adapted for the service indicated is said to have been ordered in 1904, the length being about 36 ft. and the displacement 21 tons. The Goubet type of submarine was of very small size and was worked out successfully by its inventor; but it has not been officially approved or adopted by French naval authorities. It could have been readily carried on shipboard, being about 26 ft. long with a lifting weight of less than 10 tons; the speed was about 5½ knots, and the radius of action 25 knots. Propulsion was by electrical power, and the armament consisted of locomotive torpedoes carried outside the vessel with suitable releasing gear.

The trials of the Aigrette and submarine Z are said to have led to the suspension of the construction of proposed submarines of 420 tons displacement (Emeraude class), and of smaller submarines which M. Pelletan had ordered in amendment of his predecessor's programme for vessels of the Aigrette class. So far as these trials in France bear upon British construction there is every reason for congratulation. Our later vessels have all been of the submersible rather than of the submarine type; and their designs have been continuously improved on definite lines towards one general direction. Our B class of submarines are of 300 tons displacement and 850 H. P., with a surface speed of 13 knots and radius of 500 miles. Fresh supplies of gasoline can be readily obtained at sea from depot ships. These vessels, therefore, compare favorably with the future submersibles contemplated in France. As to the time required for diving, the British submarines take three minutes, which is less than the time occupied in the French trials. Obviously, it is a serious hindrance to real progress if the personal views of any individual who may temporarily occupy the post of Minister of Marine are allowed to interfere with well-considered programmes of naval construction. In France this has happened repeatedly, and every one familiar with French naval literature knows how strong has been the expression of opinion by competent writers in regard to the evil effects of continual changes of policy. The debates on current French Navy Estimates since M. Thomson has become Minister of Marine have illustrated and condemned afresh the proceedings of amateurs in naval design, whose political position enabled them to suspend or to radically change schemes which were in process of execution. Fortunately we have not suffered in a similar way as yet, and it may be hoped we never shall.

The French *defenses mobiles* at naval ports associate torpedo-boats and destroyers with submarines, small armor-clads being used as supports. Statements made by the financial secretary to the admiralty in March last (during the debate on the navy estimates) indicate that the admiralty policy is in general agreement with French practice so far as the association of submarines and surface torpedo-vessels is concerned; but there was no mention of armored vessels being employed as supports. In speaking of submarines Mr. Prettyman said:

They are able through their invisibility to do in the day exactly what surface torpedo craft can do by night. The main attribute of the latter is invisibility; that invisibility submarines attain by day. They have, of course, a very considerable moral effect upon an enemy. . . . You may classify a submarine as a "daylight" torpedo boat of moderate speed and very considerable radius of action. . . . It is not a present condition, but it certainly may be looked upon as a possible condition, that certain areas in war time, by the use of surface torpedo craft by night and submarines by day, may be practically denied to large ships. At present the only answer to them is that the other belligerent should be in a similar position to deny these same waters to its enemy's ships. Therefore the submarine in that particular is the only answer to the submarine. There is one other immediate and very important function of the submarine, and that is the defense of our ports, harbors and coast. That is the most important point. It is quite clear that the use of the submarine expands the range of the defense far beyond the guns of the forts defending any harbor. These vessels will not only defend the ports but link up the defenses, and the possession of a sufficient number of them would greatly reduce the anxiety of any admiral entrusted with the defense of our coast.

This official statement of the role to be assigned in the immediate future to British submarines obviously had been carefully considered, and action has since been taken in

assigning to each of our great naval ports a group of submarines and a depot ship which can "mother" the group. Further, it has been decided that the system of submarine (observation) mines hitherto adopted as an important section in schemes of harbor defense shall be abolished, torpedo vessels and submarines being employed instead. Mr. Balfour, in his recent explanation of work done by the Committee of Imperial Defense, stated that "the submarine mine is, at all events as far as this country is concerned, a very inexpedient method of attempting to secure the safety of these ports. It is a method more likely to produce an injury to the defenders of the ports, or to the commercial interests concerned, than to the enemy; and other methods should be substituted for this method, which, in our opinion, is not only antiquated, but dangerous." Many authorities take exception to this view and dispute the wisdom of abolishing existing arrangements; but the change decided upon is in process of execution at the great naval ports and the defensive flotillas are being organized.

Coast and harbor defense has been treated hitherto as the special function of existing submarines; but the development of the type and the large increase which has been made in size, engine power, speed, and radius of action indicate the possibility of British submarines, as well as surface torpedo craft, being employed in future operations against an enemy's coast where the defense includes flotillas of a similar character. As the result of numerous experimental trials with vessels of their *defenses mobiles*, French writers agree that close blockade of harbors and coast-lines has been rendered practically impossible by the introduction of swift surface torpedo-boats and the use of submarines. The operations off Port Arthur have furnished striking illustrations of what is likely to happen in future blockades. Although submarines were not employed by the Russians, the Japanese battle-fleet kept at a considerable distance and was linked up by cruisers to in-shore squadrons of torpedo vessels. If submarines had been present, similar dispositions would doubtless have been maintained. If the Russians had used submarines and the Japanese had possessed vessels of that class, there is no probability that rival submarines would have been used against each other. A defending force operating from a well-equipped base over a moderate radius will always possess great advantages over an attacking force of submarines and torpedo craft attached to a blockading fleet. For purely defensive work submarines of small size will be capable of fulfilling the restricted conditions of service. A larger number of such vessels could be constructed for a given sum and the chances of a successful attack would undoubtedly be increased by increase in numbers. This is the explanation of the latest French proposals for two types, the larger designed for offensive operations, and endowed with a considerable radius of action, and the smaller limited to defense. No doubt the larger type could perform the duties which it is proposed to assign to the smaller, but for a given total expenditure more vessels can be obtained when both types are built; and, assuming the limited radius of action and lower speed to be reasonable for coast and harbor defense, the destructive power of the smaller type, when a successful attack has been made and the enemy has been attained by the locomotive torpedo, is practically the same as that of the larger type. There is no indication that a similar policy finds favor at the admiralty, but it may be presumed that our earlier and smaller submarines will be utilized for coast defense only; and, as improved types are introduced, vessels which preceded them will fall back into coast defense duties. Submarines, like all other types, must suffer degradation in relative rank by lapse of time and improvements in construction.

The submarines which the Japanese navy are understood to have acquired since the war with Russia began are said to be of dimensions approximating to the Holland type, adopted for the United States navy, and repeated in the first

orders given for the Royal navy. It seems improbable that use was made of these vessels in the great battle in the Korean Straits, and no Japanese report up to the time of writing makes reference to submarines; so that Russian reports of their employment and success are probably erroneous. The heavy seas which prevailed in the earlier stages of the battle were most unfavorable to the use of submarines of the type described, and the continuous movements of the fleets while engaged involved small prospect of successful submarine attacks. On this point, however, fuller information will be available hereafter, and it will be of great interest to see what the policy of the Japanese authorities will be in the immediate future.

SKETCH OF FREDERIC NICHOLLS

The *Canadian Engineer* has the following to say concerning Frederic Nicholls, who has recently become the president of the Canadian Ship Building Co.

"Herbert Spencer says—in his *Study of Sociology*: 'If you want roughly to estimate any one's mental calibre, you cannot do it better than by observing the ratio of generalities to personalities in his talk—how far simple truths about individuals are replaced by truths abstracted from numerous experiences of men and things and when you have thus measured many, you find but a scattered few likely to take anything more than a biographical view of human affairs.'

"Judged by this standard, the subject of our first biographical sketch ranks high among the intellectual forces of the day. Among Canadian captains of industry, Mr. Nicholls has not a peer for broad generalization and comprehensive grasp of business affairs. That the business men of Canada have confidence in his judgment and executive ability is manifest; for he is president, vice-president, or director, of thirty of the largest manufacturing and commercial concerns in the Dominion; vice-president and general manager The Canadian General Electric Co.; vice-president Canada Foundry Co.; vice-president Dominion Iron & Steel Co.; vice-president and managing director of the Electrical Development Co. of Ontario, Ltd.; director Canadian Bank of Commerce; president The Canadian Ship Building Co., etc., together with directorate interests in Cuba, Brazil, Argentina, etc.

"Although not a specialist in civil, mechanical, or electrical engineering—as such, Mr. Nicholls is entitled to the place of honor in our gallery of men who have done things; for the remarkable development of electrical enterprise in Canada, culminating in the colossal works now being built at Niagara Falls, is due more to him than to any other man; whilst the immense general engineering plant of The Canada Foundry Co.—probably the best designed and equipped in the Dominion, and which will be fully described and illustrated in our August number,—is the work of his hands. His mind is now turned towards marine engineering, and the development of the ship building interests of the country.

"Frederic Nicholls was born in England, November 23, 1856. Educated at Stuttgart, Wurtemberg. He crossed the Atlantic for Canada in 1874. When the philosophic historian comes to write the industrial history of Canada, the name of Frederic Nicholls will have an important place; as one who, by his fine business tact, unique executive ability, and indomitable energy—supplemented by a high code of ethics, helped mightily to develop the resources and shape the destinies of the greatest colony in the British Empire.

The seven battleships composing the battleship squadron of the North Atlantic fleet held another speed contest under forced draft last week in going from Provincetown, Mass., to Newport, R. I. The Missouri took the lead, developing a speed of 18.1 knots per hour, which is within four-tenths of a knot of what she made on her official trial.

LONDON'S DOCKS

The tower of London, gray and square, stands sentinel at the most romantic spot in the vast city of London. On one side are the offices, the banks, the exchanges, the shops, the squares and the great gorgeous residences of the rich, and on the other nothing but the roaring factories, the crowded warehouses and the long, interminable slums of toilers. It is here, at this romantic parting of the ways, that the London docks begin. Across the swirl of the chafing Thames strides Tower Bridge, shutting out all hint of beautiful embankments, luxurious hotels, stately Parliament houses and polite bridges for cabs and carriages. Everything that the eye beholds here is eloquent of London's commerce, and of that alone. An unbridged Thames, with monstrous warehouses, crowded wharves and a tangle of shipping.

Towering chimneys, a pall of smoke and running down to the river narrow, cobbled streets, filled with wagons and drays. You look about you and forget the London of ease and luxury; forget, also, the London of hunger and misery; you are looking on the London of commercial supremacy, the London of universal trade, the market of the world. Something like 700 vessels pass up and down Gravesend in a single day, and in one year between 4,000 and 5,000 vessels, bearing nearly 9,000,000 tons, make their way to these London docks.

The London & India Docks Co. rules over an estate of 1,700 acres, with over 20 miles of quay and 15,000,000 square feet of flooring for the handling and storage of over 800,000 tons of goods. The largest ships of all the world enter England through the gates of the Thames and make their way to these London docks.

You look along the quays and behold steamers from China and the East Indies, from South America and Canada, from Egypt and New Zealand, rigid there and quiet now, after long buffeting with stiff seas. Hundreds of London dockers swarm over them like egg-laden ants, while enormous engines rattle their swinging chains over them, and the scrapers get to work on the cracked and faded paint of their sloping sides. There is no idleness in the docks. The brown-faced men who have brought these steel monsters across the seas are smoking luxurious pipes at home, dancing children on their knees, taking their wives to music hall and theater, and, not a doubt of it, spinning yarns about the wonderful world down under; but here in the docks are shabby, pale-faced, thick-armed Londoners, running to and fro with packages on their bowed shoulders, sweating to empty the vessels that lie there; here, too, are engine drivers, steering their trains from dock to dock, and carriers driving away with vanloads of merchandise—everywhere Londoners waiting on these huge ships. The sailors are like gentlemen who have driven their equipage to the stable and left these grooms of the docks to clean up ready for their next excursion.

You get some idea of London's trade by moving through the tall warehouses of the docks. Consider a few figures. Thirty-six thousand tons of tea are stored here in a single year. In the vaults, with their 28 miles of gangway, can be stored 100,000 pipes of wine. Two hundred and fifty thousand tons of wool, worth £20,000,000, arrive annually at the port of London. Twenty thousand tons of tobacco are here in bond, valued at £9,000,000. There is accommodation in the cold storage warehouses for 864,000 sheep. Sixty thousand pounds of ostrich feathers have been stored here at one time, and several millions of bird skins arrive annually, too numerous for computation. In addition, the London docks have accommodation for sugar, ivory, spices, bark, gums, metal, marble, drugs, dates, pepper, rice, coffee, cocoa, isinglass, coal, grain, furniture, wood, timber, carpets, butter, cheese, poultry, even for sea shells, sponges, musk, ambergris and beeswax. In a single room you may look at elephants' tusks worth nearly £100,000.

The gardens and the factories of the world empty them-

selves into this lap of London. There is hardly a little island set in the midst of the seas which does not grow something or make something with brown fingers to send into the cold, gray port of London. As you walk through the warehouses your nostrils are filled with the scents of the earth—cinnamon, nutmeg, musk, vanilla, coffee, tea, tobacco—everything that once lived and drank the air in green and beautiful gardens across the seas. There at your feet lies the matting torn from tea packages on which some Chinaman set strange marks with brush and ink, and there are the red and green cases themselves, with the number and weight cut in their sides by a scribing iron. You look at even the nails in some strange package of goods out of the East, and picture to yourself the dark hands gripping them while the hammer struck home. All the hands and all the feet of the East seem to be going up and down the earth to keep the larder of London full. From San Francisco comes the extract of flowers for London's scent.

DIVIDEND IN SHIP COMMON

At a meeting of the board of directors of the American Ship Building Co. on Wednesday, a dividend of 4 percent was declared upon the common stock of the company, payable quarterly, the first payment to be made in September. The company has a great deal of work on hand and has enjoyed an unusually prosperous business, having according to its last annual statement, a surplus of nearly \$4,000,000 in its treasury.

RIVER NEWS

The National Waterways congress will meet at Baltimore on July 27, this being the first convention of this body since the Baltimore meeting four years ago. The Ohio Valley Improvement association will be represented by Capt. W. B. Rodgers and George H. Henderson, of Pittsburg, and Capt. J. F. Ellison, of Cincinnati. Action will be taken looking towards increased appropriations from congress for the improvement of internal waterways throughout the country and especially the Ohio valley.

Major W. L. Sibert, United States engineer in charge of the Pittsburg harbor, Pittsburg, is receiving bids for two lock gates for each of the following locks, Nos. 2, 3, 4 and 5. The bids will be opened on July 31.

The libel suit in admiralty of James Baoker and others against the steamer Queen City of the Pittsburg & Cincinnati Packet Line, Pittsburg, was dismissed by Judge Buffington. The case involved the death of one of the crew who was alleged to have been thrown overboard by an officer. The court held that the testimony of some of the crew indicated that they were well treated and concluded that the desertion of the boat at Pittsburg by the plaintiffs was, as contended by the boat's officers, a plan to work their way north on lower river boats, and when the entire ten men were called before the court and an offer made to return them to Cincinnati, and thus ensure them against any cruelty, they all refused to go.

The steamer Harry Brown, owned by the Monongahela River Consolidated Coal & Coke Co., struck a rock while coming up the Ohio river at dock No. 2, Pittsburg, this week, and was sunk. The boat was bringing a fleet of empty barges to Pittsburg, a number of which were also sunk. The boat will be raised.

The Marine Construction Co., Mariner's Harbor, N. Y., has been organized with a capital of \$105,000. The incorporators are Thomas Conyngham, Montclair, N. J.; Theodore T. Lane, 170 Broadway, New York; Alfred T. De Forest, 56 Pine street, New York.

WORK AT NEWPORT NEWS

Norfolk, Va., July 19.—While naval officers are having a lot to say about the Brooklyn navy yard eclipsing the Newport News Ship Building & Dry Dock Co. in the Connecticut-Louisiana battleship construction contest, the fact remains that the Louisiana, building at Newport News, is now in the lead and has been under way a shorter time than the Connecticut has been building. There is every reason to believe that the Louisiana will be finished before, certainly not after, the Connecticut is turned over to the government. There is at least three months difference in the time the two ships have been under way and the margin is in favor of the Newport News yard. This is a point that very few, even those who have been presenting the claims of the Virginia ship builders, have raised.

Congress made an appropriation for the construction of two 16,000-ton battleships of high speed, one of which, it was stipulated, must be built at one of the United States navy yards, and the other to be awarded to the lowest responsible bidder of the private shipyards submitting proposals. The navy department at once designated the Brooklyn navy yard, that being the only one on the east coast that was reasonably well equipped to take up the work. The superintending constructor was authorized without delay to make his preparations and begin work on the ship. While a start was thus being made by the government builders, the navy department advertised for bids for the construction of the other ship, sending out plans and specifications to those yards that signified their purpose of bidding. The shipyards prepared their bids and submitted them some weeks after the construction of the Connecticut began. When the proposals were opened the Newport News company was found to be the lowest bidder. The bureau of construction went over the bids carefully and made a recommendation to the secretary of the navy in favor of awarding the bid to Newport News. The secretary acquiesced and so notified the shipbuilding company. This was from two to four months after the active work on the Connecticut started. In these days of modern battleship construction a month means from 2 to 3 percent and sometimes more, as the records of the Newport News company will show. It is not too much to say that had the Louisiana been started simultaneously with her sister ship the former would now be in the neighborhood of 10 percent in the lead.

In the race with a government navy yard, where no other construction is under way, where the whole machinery of the navy department is back of the constructors and where the ship is being built without delay in inspection, it must be conceded that the record of the private plant on the Louisiana has been highly creditable.

It is authoritatively stated that Furness, Withy & Co. have purchased the Chesapeake & Ohio railroad's interest in the English line of steamships plying between Liverpool, London, and Newport News, known as the Chesapeake & Ohio Steamship Co. The fleet, which now consists of six ships, was owned jointly by Furness, Withy & Co. and the Chesapeake & Ohio railroad, the latter holding 60 percent of the stock. It is admitted at the local offices of the company that the deal has been under way and that it probably has been consummated, although no intimation has been given of any changes.

Lieut. C. P. Shaw, U. S. N., retired, who is located here, is the father of a movement that will take shape here looking to the presentation to the battleship Virginia, now nearly ready to commission, a marksmanship medal fund instead of the traditional silver service. It

is the lieutenant's idea to use the money that would be devoted to the purchase of a silver service for the purpose of capitalizing a fund out of which a fine medal would be purchased annually for the gunner making the best target record.

CENTENNIAL OF STEAM NAVIGATION

The committee appointed by Mayor McClellan to consider and report a plan for the celebration of the centennial of steam navigation in 1907 met at the mayor's office in New York last week. The following members of the committee were present: Oscar S. Straus, Commodore C. H. Loring, U. S. N. (retired), Rear Admiral George W. Melville, U. S. N. (retired), Aaron Vanderbilt, Gustav H. Schwab, Frank S. Gardner, James H. Kennedy, Louis T. Romaine, Arthur English, George F. Gregory and James A. Wright. Messrs. Clyde, Metz, McCarroll, Kelly, Wooley and Guilledeau of the committee were absent from the city.

Mayor McClellan called the meeting to order, expressing his hearty sympathy for the object in view, commending it to the earnest consideration of the committee, wishing them complete success and pledging his co-operation in every way in his power. In conclusion the mayor introduced Mr. Oscar S. Straus as the temporary chairman of the committee.

Mr. Straus in taking the chair thanked the mayor for the interest he had shown in the proposed celebration and for his promise of co-operation, etc. Mr. Straus spoke earnestly of the importance of the work entrusted to the committee, and in conclusion requested that a permanent chairman be elected, stating that it would not be practicable for him to continue as chairman, though from no lack of interest.

After considering the matter, Mr. Wm. McCarroll, president of the New York Board of Trade & Transportation, was elected the permanent chairman. Mr. James H. Kennedy was elected the secretary. Upon motion of Mr. Schwab, the chairman was requested to appoint a sub-committee on plan and scope, to report to the next meeting of the committee. It was also moved and carried that the time and place of holding the next meeting of the committee be referred with power to the chairman.

FIRE PROTECTION FOR CITY PROPERTY

The department of docks and ferries of the city of New York has just equipped all the recreation piers along the North and East rivers with safety fire bucket tanks, manufactured by the Safety Fire Extinguisher Co. of New York. The new ferry-boats to run between the Battery and Staten Island are also being equipped with these safety fire bucket tanks as fast as they are completed and put in commission. This system of fire protection is a vast improvement over the old plan of open water pails, which in winter weather are either found frozen solid or else stored below deck, and in summer they are either empty or foul smelling. The tanks used by the city are of forty gallon capacity, containing a chemical solution and six buckets with self raising handles. The solution besides being a powerful fire extinguishing fluid, also keeps the water sweet and prevents freezing at 20 degrees below zero. The tanks are very suitably japanned a bright red, which makes them conspicuous, always in sight and ready for use.

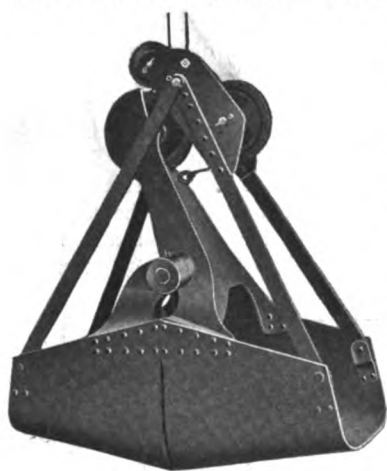
Peary's exploration ship Roosevelt left on its journey to the North pole this week. She was given a royal salute as she left the harbor. The Roosevelt is the best equipped ship that has ever been sent on such an expedition, and Commander Peary is confident that if he does not actually reach the pole he will come nearer to it than any other explorer.

A NEW CLAM SHELL BUCKET

The subject of clam-shell buckets has become one of vital interest to all who have bulk material to handle or excavating to do, and as a consequence many inventions have come to life and the number is steadily on the increase. The first patent issued by this government on buckets of this character was in the year 1846 since which time several hundred have been issued, until now the number each year is quite large, so varied are the designs and in most cases so complicated, that it is an exception to find one as simple, and seemingly as effective as the one just issued to Mr. Gurdon H. Williams of Cleveland, O. The interesting features of this bucket are its simplicity, few working parts, great strength and digging qualities.



THE BUCKET OPEN.



THE BUCKET CLOSED.

This bucket comprises two scoop members hinged together in the ordinary manner. The hinge section attached to one of the scoop members extends beyond the pivotal connection, forming an arm, in the outer end of which is located a sheave. The outer ends of the scoop members are suspended by bars, properly attached to same, the upper ends of which are connected together by means of plates and pins, the plates forming the head and the sheave supports. In this head properly located are two sheaves. To the hinge arm at a point near its outer end is dead-ended a cable, which passes around one of the sheaves located in the head, back around the sheave in the arm, up to and under the second sheave in the head of the bucket, this second sheave acting as a guide for the cable only. This cable thus multiplied forms the closing power of the bucket. To the head of the bucket is attached a second cable, which holds the bucket in position while opening and is used to lower the bucket into the material. Among those in use is one on the Lighter Rescue, owned by the Great Lakes Towing Co., of three yards capacity, which has been subject to severe use under most adverse circumstances, proving itself equal to every demand.

Mr. Williams of the G. H. Williams Co., 1512 Rockefeller building, Cleveland, O., who manufacture these buckets, has had over twenty years' experience in this line of work, and is undoubtedly one of the best posted men in the United States on clam-shell buckets. Many of his inventions are now in use by other concerns.

TRADE NOTES

The Post & Lester Co., Hartford, Conn., have just issued a bulletin devoted to swivel searchlights and clocks adaptable for motor cars and motor boats. The circular is quite interesting and gives a price list of the various makes. It may be had for the asking.

The Browning Engineering Co. of Cleveland has just issued a catalogue devoted to the Browning locomotive cranes. It is splendidly illustrated with half tones showing what the cranes with their automatic buckets can do and also continual line drawings of sectional parts of the equipment.

Among recent orders for marine generating sets taken by the B. F. Sturtevant Co. of Boston, Mass., are included those for F. B. Pulson's and Timothy Eaton's private yachts, building at Toronto, Ont., for the tug Menasket, and through the Portsmouth Navy Yard, for shops of the U. S. Navy.

The Crandall Packing Co., Palmyra, N. Y., has just issued a catalogue and price list of their improved steam ammonia and hydraulic packings. The Crandall Packing Co. has attained a high standard of quality against the most active competition. The catalogue is a very complete one and will be sent to anyone upon request.

Contracts for complete heating and ventilating systems have recently been taken by the B. F. Sturtevant Co. of Boston, Mass., for the Fall River Iron Works Co., Fall River, Mass.; Nashua Mfg. Co., Nashua, N. H.; Bemis Bros. Bag Co., Kansas City, Mo.; Fore River Ship Building Co., Fore River, Mass.; Lewis A. Crossett, North Abington, Mass., and Trenton Brass & Machine Co., Trenton, N. J.

The Crane Co. celebrated its fiftieth anniversary July 4. All of the company's branch house managers took part in the celebration. Monday the branch house managers went through the Crane Co.'s factories; in the evening at 7 o'clock they were given a dinner and taken to the "White City," where an evening was spent visiting the various shows. Tuesday morning the managers went to Lake Geneva, Wis., where they were entertained by Mr. R. T. Crane at his summer residence that and the following day. Thursday, July 6, the company gave to all its employees and their families a picnic at North Western Park. About 10,000 people attended this picnic. As a souvenir of the anniversary, the company is furnishing to anyone in the trade a metal elephant, to be used as a paper weight. These elephants may be obtained upon application at any of the branch houses or to the general offices in Chicago.

Among the few American inventions which are on display at the naval, shipping and fisheries exhibition at Earl's Court, London, this summer, a full size working exhibit of the Long Arm System of electrically operated watertight power doors has attracted great attention from the large number of naval experts who have visited the display. This system, from a central station located at a convenient point on the bridge of the ship, closes the doors and hatches of the vessel in time of emergency, providing for the local safety of men involved by a liberty action attached to each door. The device has now been installed on some thirty American men-of-war, and the admiralty departments of numerous foreign governments are interesting themselves in the system with a view to placing it on all their own ships. In addition to the exhibit at Earl's Court, there is another full size working exhibit on display at 39 Victoria street, London.

The turbine steamer Viking built for the Isle of Man Steam Packet Co. has just undergone her speed trial. The Viking is the first high speed Irish channel passenger steamer to be constructed on the Tyne. She is an unusually fast steamer, her day's performance showing out to the remarkable average of 23.53 knots per hour. During the last hour she made 24 knots. She is 361 ft. long, is modeled on very fine lines, is as luxurious as an Atlantic liner and is equipped with Parsons steam turbines of 10,000 H. P.



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No. 3.

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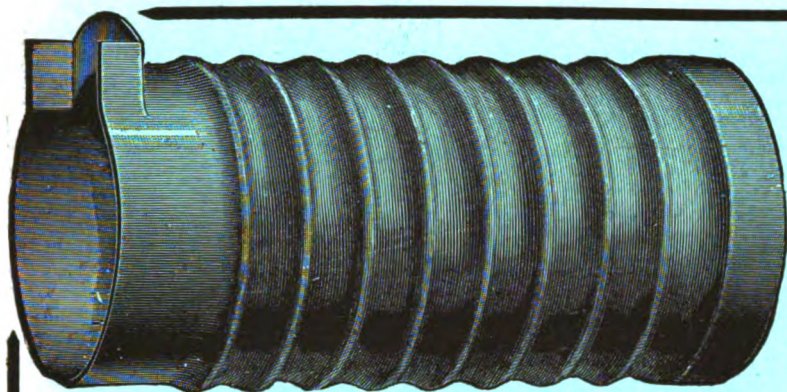
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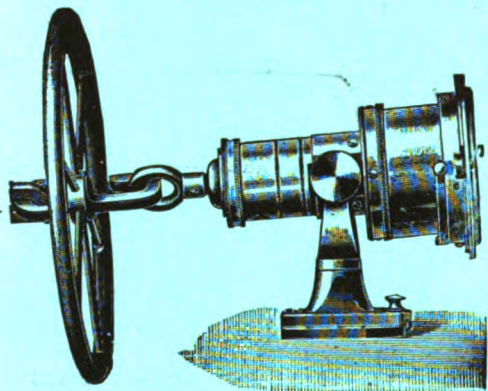
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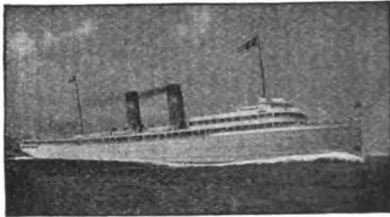
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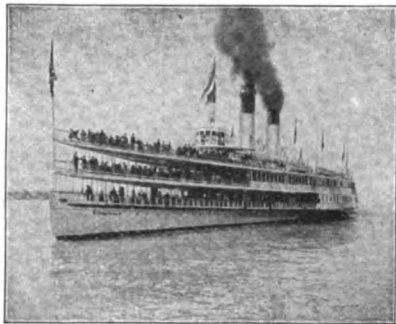
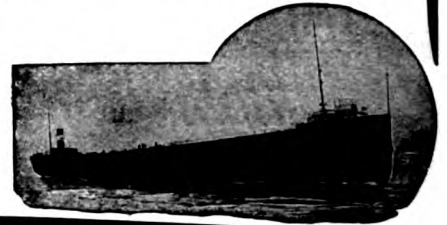
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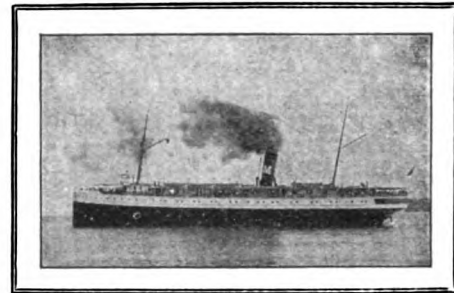
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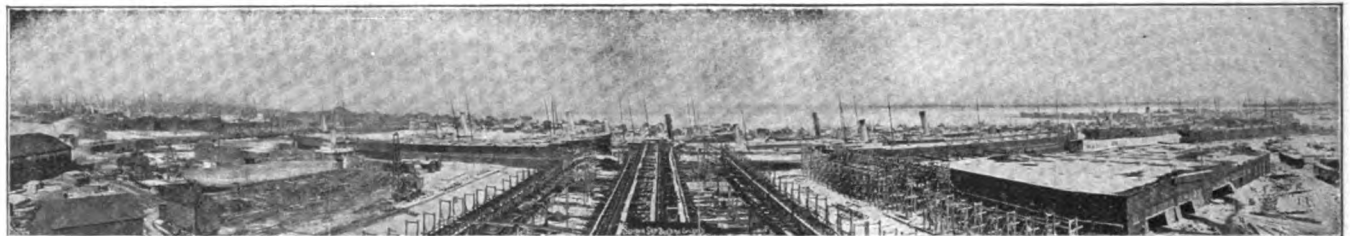


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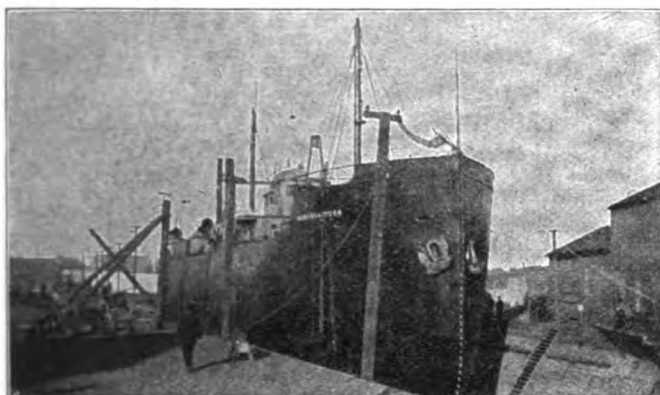
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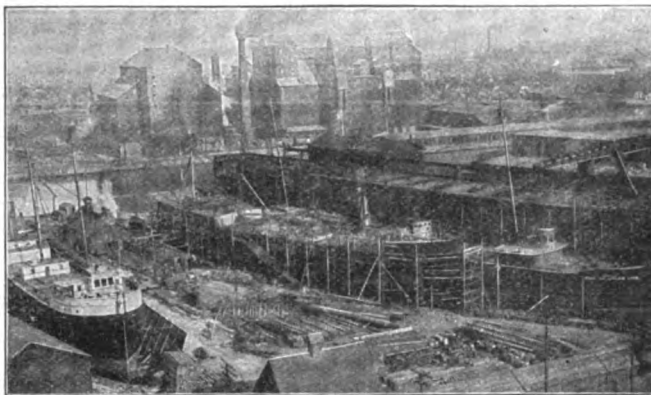
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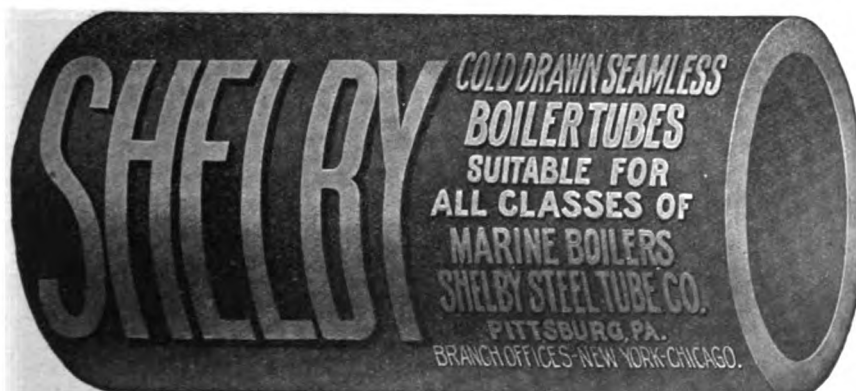
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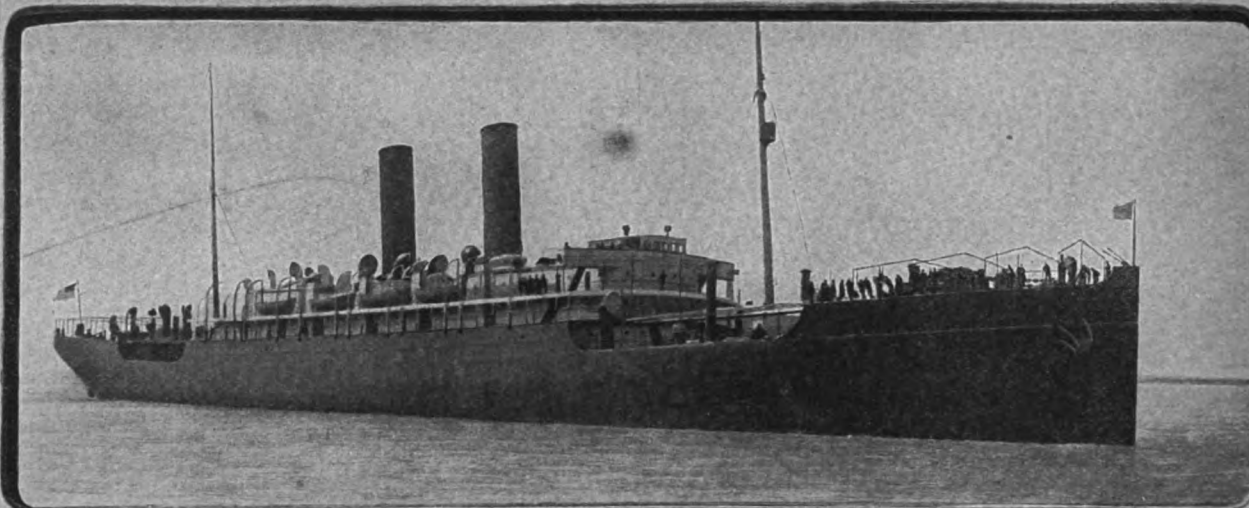
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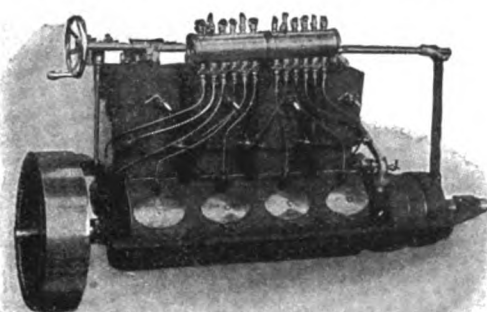
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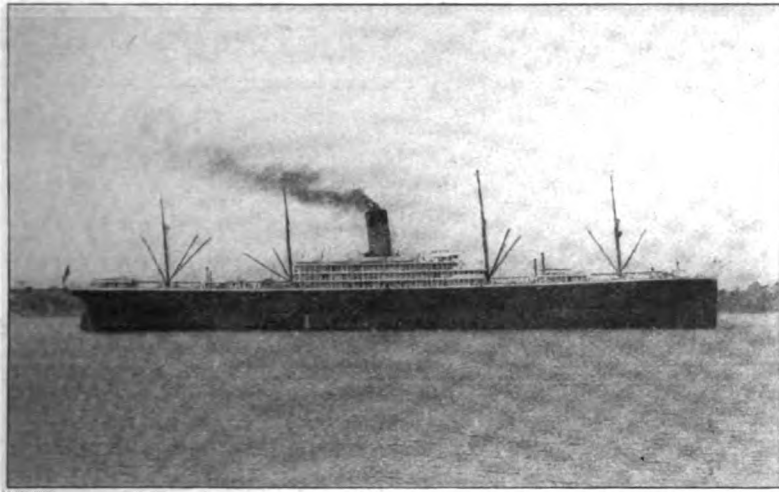
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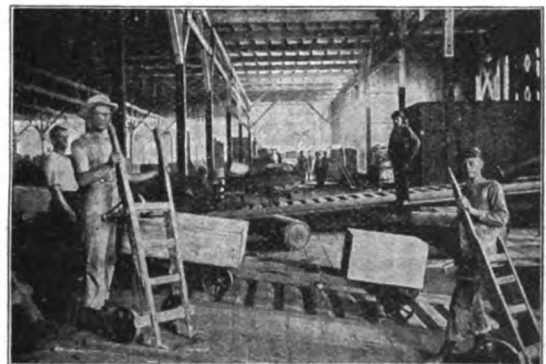
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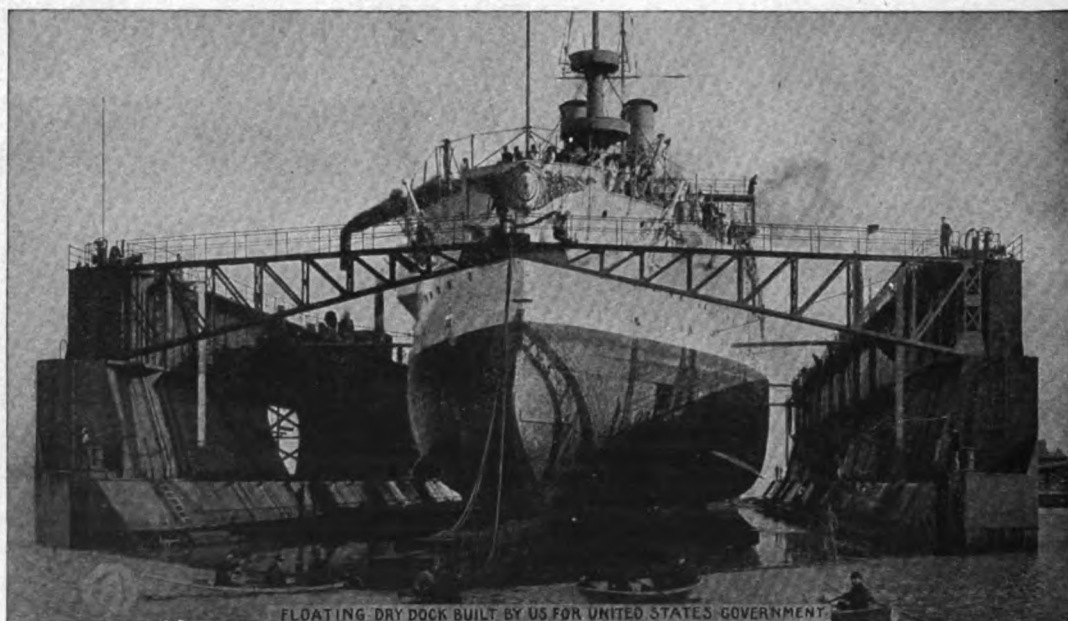
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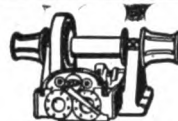
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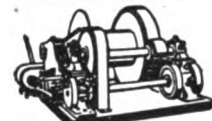
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Weitzel Lock, from above.
Weitzel Lock, from below.
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Gate Mechanism.
Interior of Power House.
Canadian Lock from Upper End.
Canadian Lock from Lower End.
Steamers Entering and Leaving Poe Locks.
The Rapids, looking up.
The Rapids, looking across.
Indians fishing in the rapids.

FOR SALE BY

The Marine Review, Cleveland.

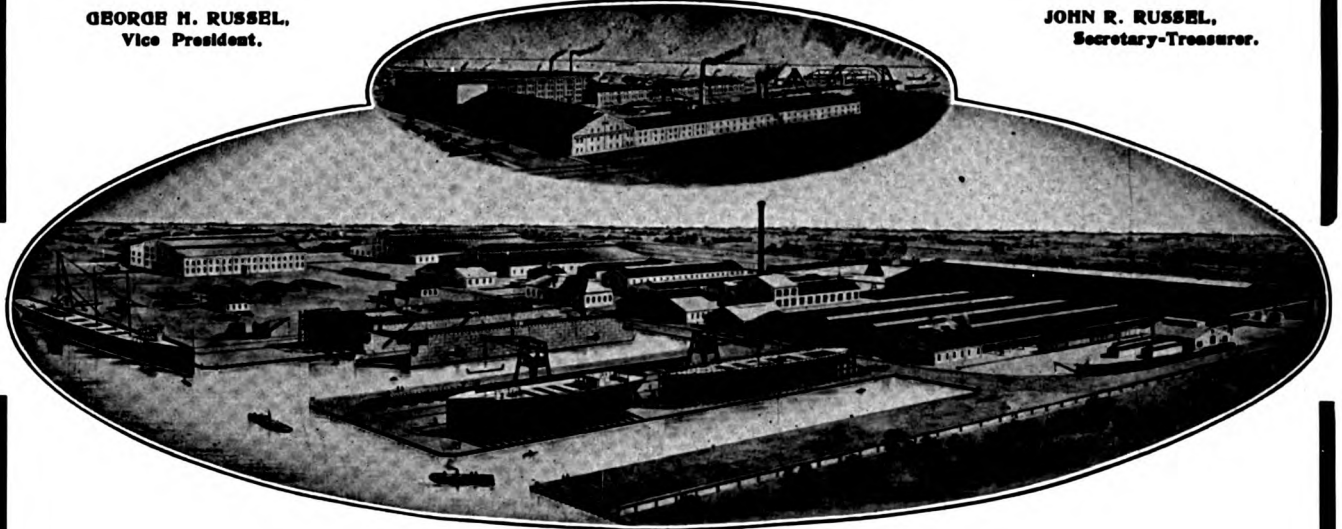
GREAT LAKES ENGINEERING WORKS

DETROIT, MICH.

ANTONIO C. PESSANO, President and Gen. Mgr.

GEORGE M. RUSSEL,
Vice President.

JOHN R. RUSSEL,
Secretary-Treasurer.



Steel Ship Builders

Floating Dock

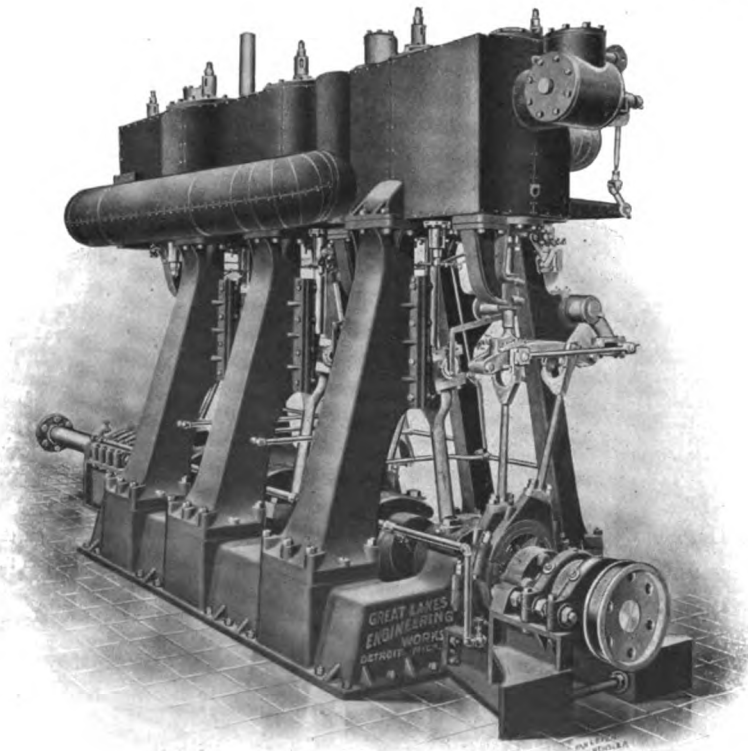
Marine Engines

**Marine
Repairs**

**Hydraulic
Dredges**

**Hydro Carbon
System**

**Propeller
Wheels**



BELLEVILLE WATER-TUBE BOILERS

NOW IN USE (MARCH, 1905)

On Board Sea-going Vessels, NOT INCLUDING New Installations Building or Erecting.

French Navy	-	-	-	-	-	-	-	-	360,560 H. P.
English Royal Navy	-	-	-	-	-	-	-	-	966,300 "
Russian Imperial Navy	-	-	-	-	-	-	-	-	253,800 "
Japanese Imperial Navy	-	-	-	-	-	-	-	-	122,700 "
Austrian Imperial Navy	-	-	-	-	-	-	-	-	56,700 "
Italian Royal Navy	-	-	-	-	-	-	-	-	32,500 "
Chilian Navy	-	-	-	-	-	-	-	-	26,500 "
Argentine Navy	-	-	-	-	-	-	-	-	13,000 "
The "Messageries Maritimes" Company	-	-	-	-	-	-	-	-	87,600 "
Chemins de fer de l'Ouest: (The French Western Railway Co.)	-	-	-	-	-	-	-	-	Steamships
plying between Dieppe and Newhaven	-	-	-	-	-	-	-	-	18,500 "
Compagnie Generale Transatlantique	-	-	-	-	-	-	-	-	1,500 "
Total Horse Power of Boilers in Use									1,939,660

Société Anonyme des Etablissements Delaunay Belleville

CAPITAL: 8,000,000 FRANCS

Works and Dock Yards of the Ermitage at Saint-Denis (Seine), France.

Telegraphic Address: Belleville, Saint-Denis-Sur-Seine

Geo. L. McCurdy

169 Jackson Boulevard

CHICAGO ILLINOIS

INSURANCE

HULLS and CARGOES

DIRECT REPRESENTATIVE OF LEADING
AMERICAN AND FOREIGN UNDERWRITERS

PLATE USERS

We can make practically immediate shipment of Bessemer and Open-Hearth Plates, sheared and universal mill sizes.

Send us your specifications.

Tubes Rivets
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BOURNE-FULLER CO.
IRON STEEL
PIG IRON
COKE
Cleveland, Ohio.



ASHTON

Cam Lever Pop Safety Valves
and Non-Corrosive
Steam Gauges.

give highest efficiency and durability.
Specify them and get the best.

The Ashton Valve Co.

Boston New York Chicago
U. S. A.

Buyers' Directory of the Marine Trade

For a more complete classification than that represented by advertisers in the Marine Review, see the BLUE BOOK OF AMERICAN SHIPPING, marine and naval directory of the United States, published by The Marine Review, Cleveland.

See accompanying index of Advertisers for full addresses of concerns in this directory.

AIR COMPRESSORS, AIR HOISTS, ETC.

Great Lakes Engineering Works.....Detroit.
Mietz, Aug.New York.

AIR PORTS, DEAD LIGHTS, ETC.

Marine Mfg. & Supply Co.....New York.

AIR PUMPS AND APPLIANCES.

Fore River Ship & Engine Co., Quincy, Mass.
Great Lakes Engineering Works.....Detroit.

ANCHORS.

Bowers, L. M. & Co.....Binghamton, N. Y.

ANTI-FRICTION METALS.

Cramp, Wm. & Sons.....Philadelphia.

ARTIFICIAL DRAFT FOR BOILERS.

American Ship Building Co.....Cleveland.
Detroit Ship Building Co.....Detroit.
Great Lakes Engineering Works.....Detroit.
Sturtevant, B. F., Co.....Hyde Park, Mass.

ASH EJECTORS.

Great Lakes Engineering Works.....Detroit.

ATTORNEYS AND PROCTORS IN ADMIRALTY.

Gilchrist, Albert J.....Cleveland.
Gould, Holding & Masten.....Cleveland.
Hoyt, Dustin & Kelley.....Cleveland.
Jenkins, Russell & Eichelberger.....Cleveland.
Kremer, C. E.....Chicago.
MacDonald, Ray G.....Chicago.
Potter & Potter.....Buffalo.
Shaw, Warren, Cady & Oakes.....Detroit.
White, Johnson, McCaslin & Cannon Cleveland

BAROMETERS, MARINE GLASSES, ETC.

Ritchie, E. S. & Sons.....Brookline, Mass.

BELT CONVEYORS.

Link Belt Machinery Co.....Chicago.

BLOCKS, SHEAVES, ETC.

Boston & Lockport Block Co.....Boston, Mass.
Cleveland Block Co.....Cleveland.

BLOWERS.

Power Specialty Co.....Detroit.
Sturtevant, B. F. Co.....Hyde Park, Mass.

BOAT BUILDERS.

Drein, Thos. & Son.....Wilmington, Del.
Kahnweiler's Sons, David.....New York.
Lane & DeGroot.....Long Island City, N. Y.
Marine Construction & D. D. Co.....
.....Mariner's Harbor, S. I., N. Y.
Truscott Boat Mfg. Co.....St. Joseph, Mich.
Willard, Chas. P. & Co. Winthrop Harbor, Ill.

BOILER CLEANING DEVICE.

Power Specialty Co.....Detroit.

BOILER COMPOUNDS.

Dearborn Drug & Chemical Works....Chicago.

BOILER MANUFACTURERS.

Almy Water Tube Boiler Co., Providence, R. I.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Babcock & Wilcox Co.....New York.
Chicago Ship Building Co.....Chicago.
Cramp, Wm. & Sons.....Philadelphia.
Dearing Water Tube Boiler Co.....Detroit.
Delaunay, Belleville & Co., St. Denis, France.
Detroit Ship Building Co.....Detroit.
East End Boiler Works.....Detroit.
Fletcher, W. A. & Co.....Hoboken, N. J.
Fore River Shipbuilding Co.....Quincy, Mass.
Georgian Bay Engineering Works.....
.....Midland, Ont.
Great Lakes Engineering Works.....Detroit.
Kingsford Foundry & Machine Works.....
.....Oswego, N. Y.
Marine Iron Works.....Chicago.

BOILER MANUFACTURERS—Continued.

Maryland Steel Co.....Sparrows Point, Md.
Milwaukee Dry Dock Co.....Milwaukee.
Mosher Water Tube Boiler Co.....New York.
Newport News Ship Building Co.....
.....Newport News, Va.
New York Shipbuilding Co.....Camden, N. J.
Northwestern Steam Boiler & Mfg. Co.....
.....Duluth, Minn.
Quintard Iron Works Co.....New York.
Roberts Safety Water Tube Boiler Co.....
.....New York.
Stirling, The Co.....New York.
Superior Ship Building Co.....Superior, Wis.
Taylor Water Tube Boiler Co.....Detroit.

BOILER RIVETS.

Bourne-Fuller Co.....Cleveland.

BOILER STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.

Falls Hollow Staybolt Co., Cuyahoga Falls, O.

BRASS AND BRONZE CASTINGS.

Cramp, Wm. & Sons.....Philadelphia.
Fore River Ship & Engine Co., Quincy, Mass.
Great Lakes Engineering Works.....Detroit.
Lunkenheimer Co.....Cincinnati.
Macbeth Iron Co.....Cleveland.

BRIDGES, BUILDERS OF.

Cowing, John P.....Cleveland.
Scherzer Rolling Lift Bridge Co.....Chicago.

BUCKETS, ORE AND COAL.

Brown Hoisting & Conveying Machine Co.
.....Cleveland.
McMyler Mfg. Co.....Cleveland.
Mayo & Bailey.....Chicago.

BULKHEAD DOORS, WATERTIGHT.

"Long Arm" System Co.....Cleveland.

CABIN AND CABINET FINISHING WOODS.

Martin-Barriss Co.....Cleveland.

CANVAS SPECIALTIES.

Baker & Co., H. H.....Buffalo.
Bunker, E. A.....New York.
Upson-Walton Co.....Cleveland.

CAPSTANS.

American Ship Windlass Co., Providence, R. I.
Hyde Windlass Co.....Bath, Me.
Marine Mfg. & Supply Co.....New York.

CEMENT, IRON FOR REPAIRING LEAKS.

Smooth-On Mfg. Co.....Jersey City, N. J.

CHAINS.

Woodhouse Chain Works.....Trenton, N. J.

CHAIN CONVEYORS, HOISTS.

Brown Hoisting Machinery Co. (Inc.)....
.....Cleveland.
General Electric Co.....Schenectady, N. Y.

CHAIN HOISTS.

Boston & Lockport Block Co.....Boston, Mass.

CHARTS.

Penton Publishing Co.....Cleveland.
Potter, J. D.....London.

CLOCKS (Marine and Ship's Bell) AND CHRONOMETERS.

Ashton Valve Co.....Boston.
Ritchie, E. S. & Sons.....Brookline, Mass.

COAL PRODUCERS AND SHIPPERS.

Hanna, M. A. & Co.....Cleveland.
Ironville Dock & Coal Co.....Toledo, O.
Pickands, Mather & Co.....Cleveland.
Pittsburg Coal Co.....Cleveland.

COAL AND ORE HANDLING MACHINERY.

Brown Hoisting Machinery Co. (Inc.)....
.....Cleveland.
Link Belt Machinery Co.....Chicago.
McMyler Mfg. Co.....Cleveland.

COMPASSES.

Ritchie, E. S. & Sons.....Brookline, Mass.

CONDENSERS.

Great Lakes Engineering Works.....Detroit.
Thropp & Sons Co., John E., Trenton, N. J.

CONTRACTORS FOR PUBLIC WORKS.

Breyman & Bros., G. H.....Toledo.
Buffalo Dredging Co.....Buffalo.
Dunbar & Sullivan Dredging Co.....Buffalo.
Fitz-Simons & Connell Co.....Chicago.
Great Lakes Dredge & Dock Co.....Chicago.
Hickler Bros.....Sault Ste. Marie, Mich.
Lake Superior Contracting & Dredging Co.,
.....Duluth, Minn.
Smith Co., L. P. & J. A.....Cleveland.
Starke Dredge & Dock Co., C. H., Milwaukee.
Sullivan, M.....Detroit.

CORDAGE.

Baker & Co., H. H.....Buffalo.
Upson-Walton Co.....Cleveland.

CORK JACKETS AND RINGS.

Armstrong Cork Co.....Pittsburg, Pa.
Kahnweiler's Sons, D.....New York.

CRANES, TRAVELING.

Brown Hoisting Machinery Co.....Cleveland.
McMyler Mfg. Co.....Cleveland.

DIVING APPARATUS.

Morse, A. J. & Son.....Boston.
Schrader's Son, Inc., A.....New York.

DREDGING CONTRACTORS.

Breyman & Bros., G. H.....Toledo.
Buffalo Dredging Co.....Buffalo.
Dunbar & Sullivan Dredging Co.....Buffalo.
Fitz-Simons & Connell Co.....Chicago.
Great Lakes Dredge & Dock Co.....Chicago.
Hickler Bros.....Sault Ste. Marie, Mich.
Lake Superior Contracting & Dredging Co.,
.....Duluth, Minn.
Smith Co., L. P. & J. A.....Cleveland.
Starke Dredge & Dock Co., C. H., Milwaukee.
Sullivan, M.....Detroit.

DREDGING MACHINERY.

Quintard Iron Works Co.....New York.

DRYING APPARATUS.

Sturtevant, B. F. Co.....Hyde Park, Mass.

DRY DOCKS.

American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Buffalo Dry Dock Co.....Buffalo.
Chicago Ship Building Co.....Chicago.
Craig Ship Building Co.....Toledo, O.
Cramp, Wm. & Sons.....Philadelphia.
Detroit Ship Building Co.....Detroit.
Great Lakes Engineering Works.....Detroit.
Lockwood Mfg. Co.....East Boston, Mass.
Milwaukee Dry Dock Co.....Milwaukee.
Newport News Ship Building Co.....
.....Newport News, Va.
Shipowners Dry Dock Co.....Chicago.
Superior Ship Building Co.....Superior, Wis.

ELECTRIC HOISTS AND CRANES.

General Electric Co.....Schenectady, N. Y.

ELECTRIC LIGHT AND POWER PLANTS.

General Electric Co.....Schenectady, N. Y.
Mietz, Aug.New York.
Sturtevant, B. F. & Co.....Hyde Park, Mass.
Thropp & Sons, John E.....Trenton, N. J.

WANTED and FOR SALE Department.**PROPOSALS.**

U. S. ENGINEER OFFICE, Detroit, Mich., July 14, 1905. Sealed proposals for dredging at Saginaw and Sebawaing Rivers, Mich., will be received here until 3:00 p. m., August 14, 1905, and then publicly opened. Information furnished on application. LANSING BEACH, Major, Engrs. Aug. 10

FOR SALE.**Marine Engine & Boilers.**

Fore and aft compound engine, 28—48 x 40.

Two fire box boilers 9½ ft. by 15½ ft.

Address, G. A. Trueman, Munising, Michigan.

For Sale Cheap.

Beautiful model 37¾ inches long, of passenger steamer City of Detroit. May be seen at D. & C. ticket office window, 28 Public Square, Cleveland. For photograph and full particulars, address R. J. Barrow, 102 Woodbridge avenue, Cleveland, Ohio.

Wreck of Continental For Sale.

Wreck of steamer "Continental" as she lies about two miles north of Twin River Point, Wisconsin. Also articles saved from wreck, particulars of which will be given upon application. Address Chas. E. & W. F. Peck, Cleveland, O.

Spile Driver and Scow For Sale.

A spile driver and scow 55 ft. x 28 ft. square end, drop 50 ft.; two hammers 3,800 lb. and 2,000 lb. Double 8¼ x 10 engines, vertical boiler. Cables, blocks, lines, tools, etc., all in complete working order. Immediate delivery. May be inspected at Detroit. Michigan Contracting Co., 860 Greenwood Ave., Detroit, Mich.

FOR SALE.**Yacht for Sale.**

A splendid 100-ft. gasoline cruising yacht. Fully equipped in every particular and now in commission. Outfit very complete in deck, cabin and engineer's department. This boat is equipped with three large state-rooms, large dining-room, after-cabin, two toilet rooms, crew's quarters, galley, etc. Ten to fifteen passengers can be accommodated very comfortably on long cruise. Very economical in operation, requiring but crew of three. 706 Bourse Bldg., Philadelphia.

Marine Gasoline Engine.

FOR SALE.—A 4-cylinder, 25-H. P. Leighton gasoline marine engine, with reversible propeller; perfect condition; slightly used; cost \$1,200; sell for \$500 cash. Box 577, Syracuse, N. Y.

Barge.

FOR SALE.—Small steam barge. For particulars, address Box 36, Manistique, Mich.

TUGS AND LUMBER SCOW.

One small harbor tug Alice Shipman, one large tug Temple Emery and large lumber tow barge. Can be seen at Two Rivers, Wisconsin.

Best offer wanted.

Fidelity Trust Company, Trustee,

Two Rivers Manufacturing Co.
Milwaukee, Wisconsin.

FOR SALE.**Crane.**

For Sale Cheap—Brown Hoisting Machinery Co. all iron Post Jib Crane, 15 ton capacity, 35 ft. 3 in. radius of hook, 18 ft. 6 in. lift. The hoisting mechanism is driven by dust-proof motor.

Photograph and price mailed on application.

A. Garrison Foundry Co., Pittsburg, Pa.

For Sale.

One dredge hoisting engine, double cylinders, 14½ by 14 in. stroke; clutch gear, on very heavy cast frame, drum fitted for 1½ in. cable and well suited for hard digging; all as good as new. Address JAMES PRYOR, Houghton, Mich.

Marine Boiler.

For Sale.—One 50 H. P. Scotch Marine Boiler, 10 ft. long, 78 in. diameter, 160 lbs. steam pressure. Manufactured by Ritter & Co., Buffalo, N. Y. In first-class shape. For particulars, write The Detroit Stove Works, Detroit, Mich. t. f.

Dock Lease for Sale.

Long lease of valuable dock at Sault Ste. Marie, Mich. Will sell or rent for long or short term. F. R. Warner, Trustee, Sault Ste. Marie, Mich.

The Steamer Gordon Campbell.

Burned on spar-deck—easy to cut down to lumber barge, to carry million feet. Machinery and boilers untouched. Hull untouched and in good condition. Boat in dry dock and thoroughly overhauled last summer. Can be seen in Chicago. Want best offer. Address Room 613, 59 Dearborn St., Chicago. t f

FOR SALE**The D. Robeson SHIP CHANDLERY BUSINESS at PORT HURON, MICH.**

Established 36 years. Does a large business in the sale of Cordage, Duck, Wire Rope, Blocks, Paints, Oils, Varnishes, Brushes; Roofing, Rubber Hose, Building Paper. Manufacturer of Sails, Flags, Tents and Awnings. Building is 40 x 70, two story brick, located close to boat landing. Ill health reason for disposing of real estate and business. For further particulars, write to

SCHOOLCRAFT & CO., Port Huron, Mich.

**For Sale**

Launch Factory and stock of engines and high grade hulls, finished and unfinished. One of the best factories in the country, with new machinery, good buildings, a fine testing tank, and excellent facilities for launching and shipping. Located above high water on the Ohio River. Frontage of ground, 250 ft., depth, 800 ft. Also a stock of fine launches 18 to 30 ft. long, lumber and other material. This property must be sold. Stockholders are engaged in other business and can not give it attention. With proper management and attention a fine business can be established. Write for particulars, or come and see the plant.

Neptune Launch & Mfg. Co.

Evansville,

Indiana.

If you have any second hand vessel property or marine machinery that you want to dispose of, this page will do it for you in short order. Try it.

Buyers' Directory of the Marine Trade.—Continued.

ENGINE BUILDERS, MARINE.

American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Chicago Ship Building Co.....Chicago.
Chase Machine Co.....Cleveland.
Cramp, Wm. & Sons.....Philadelphia.
Craig Ship Building Co.....Toledo, O.
Detroit Ship Building Co.....Detroit.
Fletcher, W. & A. Co.....Hoboken, N. J.
Fore River Shipbuilding Co.....Quincy, Mass.
Great Lakes Engineering Works.....Detroit, Mich.
Hall Bros.....Philadelphia.
Lockwood Mfg. Co.....East Boston, Mass.
Marine Iron Works.....Chicago.
Maryland Steel Co.....Sparrows Point, Md.
Mietz, Aug.....New York.
Milwaukee Dry Dock Co.....Milwaukee.
Mosher, Chas. D.....New York.
Moulton Steering Engine Co.....New York.
Newport News Ship Building Co.....Newport News, Va.
New York Shipbuilding Co.....Camden, N. J.
Northwestern Steam Boiler & Mfg. Co.....Duluth, Mich.
Quintard Iron Works Co.....New York.
Roach's Ship Yard.....Chester, Pa.
Sheriffs Mfg. Co.....Milwaukee.
Superior Ship Building Co.....Superior, Wis.
Thropp, J. E. & Sons Co.....Trenton, N. J.
Trout, H. G.....Buffalo.

ENGINE ROOM TELEGRAPH, CALL BELLS, ETC.

Cory, Chas. & Son.....New York.
Marine Mfg. Supply Co.....New York.

ENGINE TESTING.

Kreer & Parsons.....Chicago.

ENGINEERING SPECIALTIES AND SUPPLIES.

Crane Co.....Chicago.
Kieley & Mueller.....New York.
Lunkenheimer Co.....Cincinnati.
New York Belting & Packing Co.....New York.
Northwestern Steam Boiler & Mfg. Co.....Duluth, Minn.

ENGINEERS, MARINE, MECHANICAL, CONSULTING.

Hynd, Alexander.....Cleveland.
Hunt, Robt. W. & Co.....Chicago.
Kidd, Joseph.....Duluth, Minn.
Lovejoy, H. O.....Buffalo.
Mosher, Chas. D.....New York.
Nacey, James.....Cleveland.
Rice, Henry.....Buffalo.
Roelker, H. B.....New York.
Wood, W. J.....Chicago.

FANS FOR VENTILATION, EXHAUST, ETC.

Sturtevant, B. F. Co.....Hyde Park, Mass.

FEED WATER PURIFIERS AND HEATERS.

Greacen-Derby Engineering Co.....Perth Amboy, N. J.
Ross Valve Co.....Troy, N. Y.

FIRE EXTINGUISHERS.

Safety Fire Extinguisher Co.....New York.

FIXTURES FOR LAMPS, OIL OR ELECTRIC.

General Electric Co.....Schenectady, N. Y.

FORGES.

Sturtevant, B. F. Co.....Boston.
Sutton Co., C. E.....Toledo, O.

FORGINGS FOR CRANK, PROPELLER OR THRUST SHAFTS, ETC.

Cleveland City Forge & Iron Co.....Cleveland.
Fore River Shipbuilding Co.....Quincy, Mass.
Macbeth Iron Co.....Cleveland.

FLUE WELDING.

Fix's, S. Sons.....Cleveland.

FUEL ECONOMIZERS.

Sturtevant Co., B. F.....Hyde Park, Mass.

FUELING COMPANIES AND COAL DEALERS.

Hanna, M. A. & Co.....Cleveland.
Ironville Dock & Coal Co.....Toledo, O.
Parker Bros. Co., Ltd.....Detroit.
Pickands, Mather & Co.....Cleveland.
Pittsburg Coal Co.....Cleveland.
Smith, Stanley B., & Co.....Detroit.
Smith Coal & Dock Co., Stanley B. Toledo, O.

FUELING PLANTS, BUILDERS OF

Link Belt Machinery Co.....Chicago.

FURNACES FOR BOILERS.

Continental Iron Works.....New York.

GAS BUOYS.

Safety Car Heating & Lighting Co.....New York.

GAS AND GASOLINE ENGINES.

Chase Machine Co.....Cleveland.
Georgian Bay Engineering Works.....Midland, Ont.

GAUGES, STEAM AND VACUUM.

Ashton Valve Co.....Boston.
Lunkenheimer Co.....Cincinnati.

GAUGES, WATER.

Bonner Co., Wm. T.....Boston.
Lunkenheimer Co.....Cincinnati, O.

GRAPHITE.

Dixon Crucible Co., Joseph.....Jersey City, N. J.

GREASE EXTRACTORS.

Greacen-Derby Engineering Co.....Perth Amboy, N. J.

HAMMERS, STEAM.

Chase Machine Co.....Cleveland.

HEATING APPARATUS.

Sturtevant, B. F. Co.....Hyde Park, Mass.
Sutton Co., C. E.....Toledo, O.

HOISTS FOR CARGO, ETC.

American Ship Building Co.....Cleveland.
Brown Hoisting Machinery Co. (Inc.).....Cleveland.
Chase Machine Co.....Cleveland.
General Electric Co.....New York.
Georgian Bay Engineering Works.....Midland, Ont.
Hyde Windlass Co.....Bath, Me.
McMyler Mfg. Co.....Cleveland.
Marine Iron Co.....Bay City.
Mietz, Aug.....New York.

HOLLOW SHAFTINGS, IRON OR STEEL.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

HOLLOW STAYBOLT IRON.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

HYDRAULIC DREDGES.

Great Lakes Engineering Works.....Detroit.

HYDRAULIC TOOLS.

Watson-Stillman Co., The.....New York.

ICE MACHINERY.

Great Lakes Engineering Works.....Detroit.
Roelker, H. B.....New York.

INDICATORS FOR STEAM ENGINES.

Ashton Valve Co.....Boston.

INJECTORS.

American Injector Co.....Detroit.
Crane Co.....Chicago.
Jenkins Bros.....New York.
Lunkenheimer Co.....Cincinnati.
Penberthy Injector Co.....Detroit, Mich.

INSURANCE, MARINE.

Elphicke, C. W. & Co.....Chicago.
Fleming & Co., E. J.....Chicago.
Gilchrist & Co., C. P.....Cleveland.
Hawgood & Co., W. A.....Cleveland.
Helm & Co., D. T.....Duluth.
Hutchinson & Co.....Cleveland.
McCarthy, T. R.....Montreal.
McCurdy, Geo. L.....Chicago.
Mitchell & Co.....Cleveland.
Parker Bros. Co., Ltd.....Detroit.
Peck, Chas. E. & W. F.....New York & Chicago.
Prindiville & Co.....Chicago.
Richardson, W. C.....Cleveland.
Sullivan, D. & Co.....Chicago.

IRON CASTINGS.

Sutton Co., C. E.....Toledo, O.

IRON ORE AND PIG IRON.

Bourne-Fuller Co.....Cleveland, O.
Hanna, M. A. & Co.....Cleveland.
Pickands, Mather & Co.....Cleveland.

LAUNCHES—STEAM, NAPETHA, ELECTRIC.

Georgian Bay Engineering Works.....Midland, Ont.
Marine Iron Works.....Chicago.
Truscott Boat Mfg. Co.....St. Joseph, Mich.
Willard, Chas. P.....Winthrop Harbor, Ill.

LIFE PRESERVERS, LIFE BOATS, BUOYS.

Armstrong, Cork Co.....Pittsburg.
Drein, Thos. & Son.....Wilmington, Del.
Gaynor, T. F.....New York.
Kahnweiler's Sons, D.....New York.
National Cork Co.....Brooklyn.

LIGHTS, SIDE AND SIGNAL.

Russell & Watson.....Buffalo.

LOGS.

Nicholson Ship Log Co.....Cleveland.
Walker & Sons, Thomas.....Birmingham, Eng.
Also Ship Chandlers.

LUBRICATING GRAPHITE.

Dixon Crucible Co., Joseph.....Jersey City, N. J.

LUBRICATORS.

Crane Co.....Chicago.
Lunkenheimer Co.....Cincinnati.

LUMBER.

Martin-Barriss Co.....Cleveland.
Rayner, J.....Chicago.

MACHINISTS.

Chase Machine Co.....Cleveland.
Hickler Bros.....Sault Ste. Marie, Mich.
Lockwood Mfg. Co.....East Boston, Mass.

MACHINE TOOLS (WOOD WORKING).

Atlantic Works, Inc.....Philadelphia.

MARINE RAILWAYS.

Hickler Bros.....Sault Ste. Marie, Mich.

MARINE RAILWAYS, BUILDERS OF.

Crandall & Son, H. I.....East Boston, Mass.

MATTRESSES, CUSHIONS, BEDDING.

Fogg, M. W.....New York.

MECHANICAL DRAFT FOR BOILERS.

American Ship Building Co.....Cleveland.
Detroit Ship Building Co.....Detroit.
Great Lakes Engineering Works.....Detroit.
Sturtevant, B. F. Co.....Hyde Park, Mass.

METALLIC PACKING.

Katzenstein, L. & Co.....New York.

MOTORS, GENERATORS—ELECTRIC.

Fisher Electrical Works.....Detroit.
General Electric Co.....Schenectady, N. Y.
Sturtevant, B. F. Co.....Hyde Park, Mass.

NAUTICAL INSTRUMENTS.

Ritchie, E. S., & Sons.....Brookline, Mass.

NAVAL ARCHITECTS.

Hynd, Alexander.....Cleveland.
Kidd, Joseph.....Duluth, Minn.
Lovejoy, H. O.....Buffalo.
Mosher, Chas. D.....New York.
Nacey, James.....Cleveland.
Rice, Henry.....Buffalo.
Wood, W. J.....Chicago.

OAKUM.

Stratford, Oakum Co.....Jersey City, N. J.

OIL ENGINES.

Mietz, Aug.....New York.

OILS AND LUBRICANTS.

Dixon Crucible Co., Joseph.....Jersey City, N. J.
Standard Oil Co.....Cleveland.

PACKING.

Crane Co.....Chicago.
Jenkins Bros.....New York.
Katzenstein, L. & Co.....New York.

PAINTS.

Baker, Howard H. & Co.....Buffalo.
Upson-Walton Co.....Cleveland.

PATTERN SHOP MACHINERY.

Atlantic Works, Inc.....Philadelphia.

Books on Marine Engineering, or the Operation of Engines, and for Beginners in Engine Room.

AMERICAN MARINE ENGINEER—By Edwards.....	\$2 50	MARINE STEAM ENGINES—Sennet & Oram.....	\$6 00
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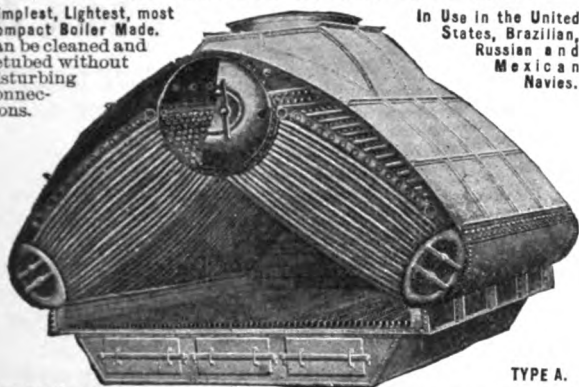
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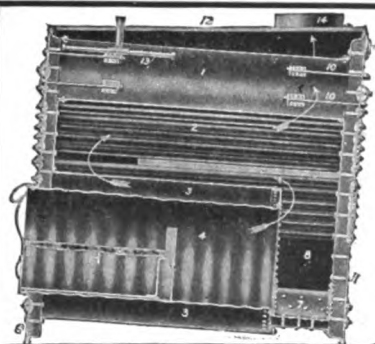
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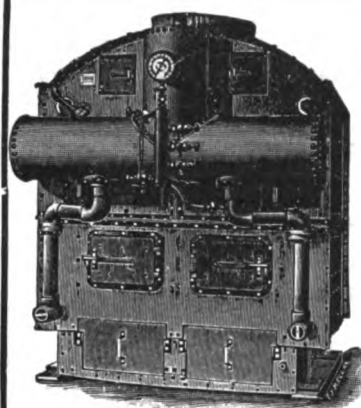
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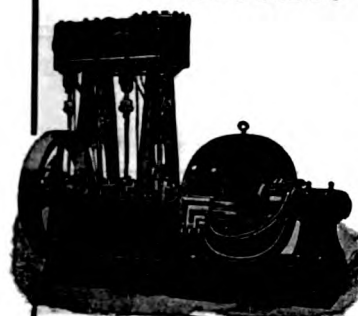
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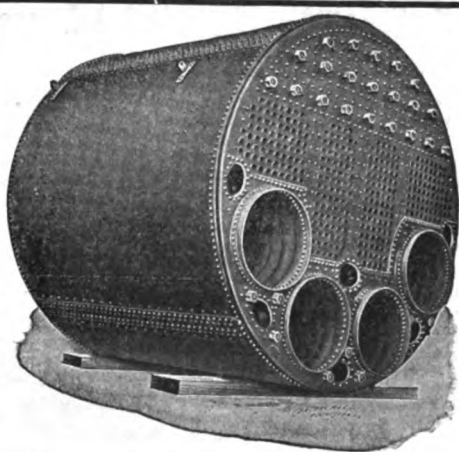
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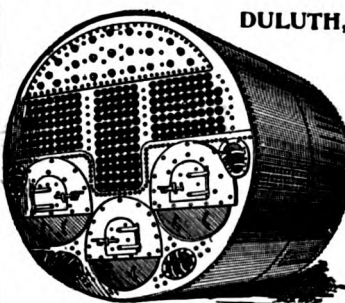
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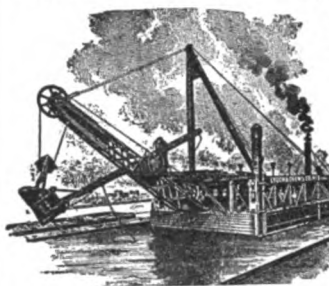
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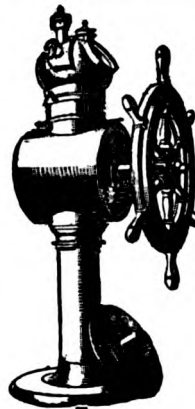
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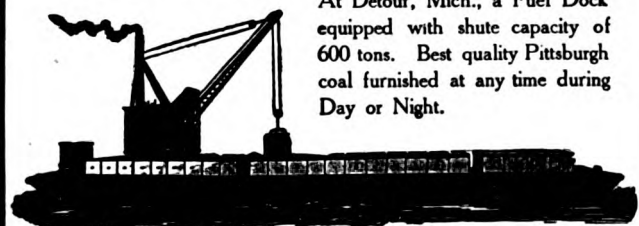
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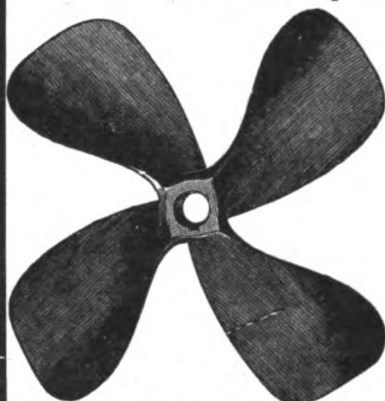
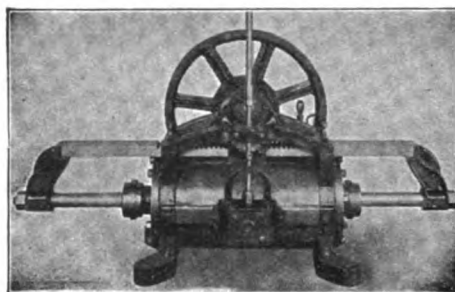
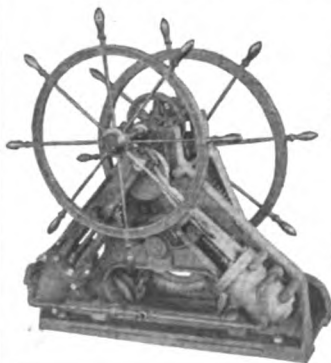
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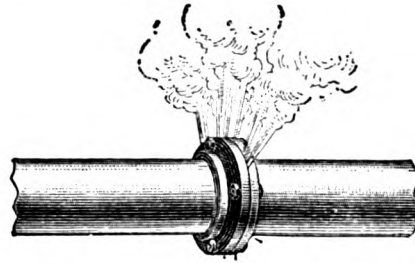


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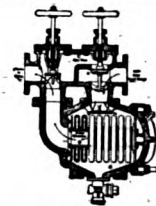
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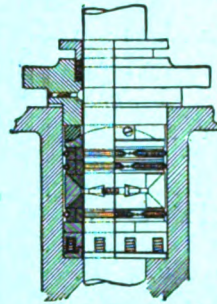
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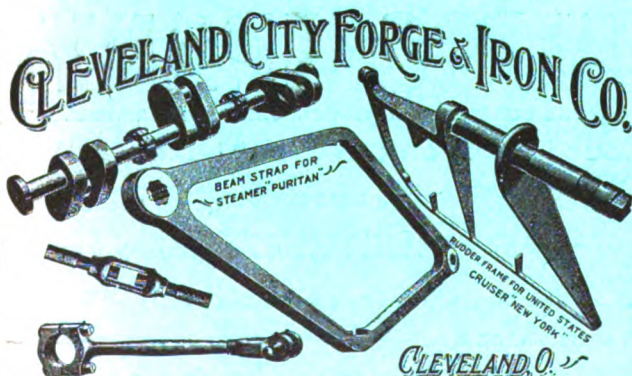
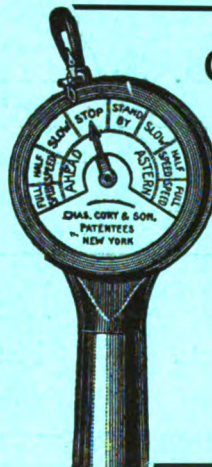
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